MODERN CAMERA GUIDE SERIES

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Praktica, Praktina, Pentacon, Edixaflex Guide

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Part I. Preparing the Camera Families for Photography

MEET THE PRAKTICA, PRAKTINA, PENTACON, AND EDIXA FAMILIES

What Every Photographer Should Know

There are three categories of Camera Guide readers: beginners, advanced workers, and professionals. For all we know, there may only be a single category because many professionals have indicated privately that they are only "consistent amateurs." They share one common goal: to use the camera advantageously. Their learning process is the same up to a point. They handle the camera, load it with film, and shoot a few practice rolls. Each worker must make a number of similar decisions. Each, therefore, can benefit from the author's standardized program of teaching the six basic shots every photographer should know. The relative care given to subject matter, technical proficiency, and consistency of results determines the status of the photographer. The camera is the same, the film is the same, the basic shot is the same.

The interrelationship of decisions regarding lighting, exposure, settings, and selecting the peak of action means that the superior decision-makers become better photographers. This Guide can show the way and set the stage for you to make superior decisions. The author's shooting plan was evolved to standardize procedures for reference. When you face an unusual situation, it becomes the starting point for an orderly way of doing things.

Still Picture Shooting Plan

PROJECT: _____

CAMERA: _____ LENS: _____

FILM: *B&W ASA*_____ *Color Neg. ASA*_____ *Color Pos. ASA*_____

ASA USED: _____

LIGHT TYPE: *Spot*_____ *Semidiffused*_____ *Diffused*_____

LIGHT SOURCE: *Name of Lights:* _____

SPECIAL EQUIPMENT *(Props, etc.):* _____

FILTERS: _____

BACKGROUND: _____

SUBJECT PREPARATION:

A Different Picture: _____

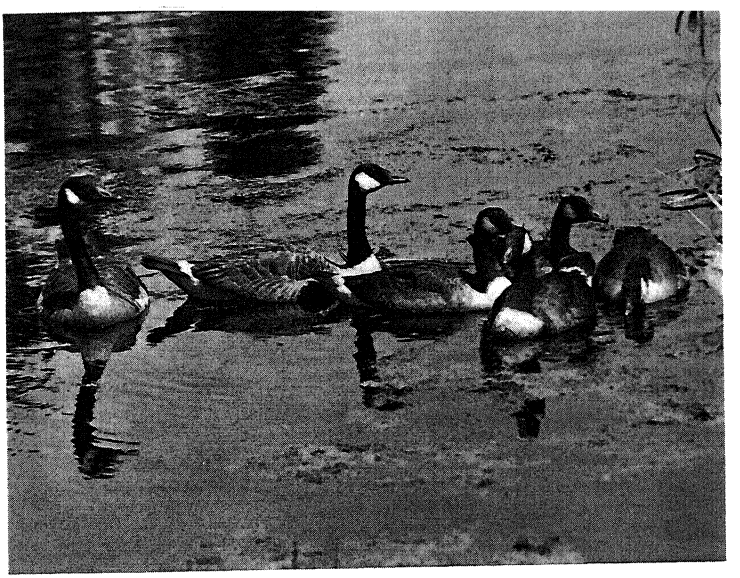
A Well-Composed Picture: _____

A Sharp Picture (Depth Required): _____

FOCUS SETTING *(for a Well-Lighted Picture):* _____
Numerical Lighting Ratio: _____
LIGHTING DIAGRAM *(for a Well-Exposed Picture):* _____
FLASH *(Name):* _____ *Synch. Setting:* _____ *Shutter Speed:* _____
SPEEDLIGHT *(Name):* _____ *Synch. Setting:* _____ *Shutter Speed:* _____
SYNCH. ATTACHMENTS: _____
FILM: *B&W:* _____ *Color Neg.:* _____ *Color Pos.:* _____
FLASH GUIDE NUMBER: _____ SPEEDLIGHT GUIDE NUMBER: _____
DEVELOPER: _____ _____ DEVELOPING TIME. _____
TIPS: _____

Learning from This Program

1. Read the Guide's camera specifications and your instruction booklet to learn the names of the parts of the camera and their functions.
2. Practice the mechanics of focusing.
3. Practice the exposure-setting procedure.
4. Set the film-speed indicator carefully because some models link the film speed to the *f*/stop lens aperture openings, and you must change the film-speed setting every time a film of a speed other than the previous one is used in the camera.
5. Read this book carefully for orientation and then re-read the first seven sections.



Basic Outdoor-Daylight Shot I; zoo project.

(1) **Basic Outdoor Daylight Shot I** requires only the camera and the film. The sun provides sufficient light for a fast shutter speed to reduce camera shooting motion, coupled with a wide selection of apertures for experimentation with sharpness for critical, depth-of-field, or hyperfocal distance planes. (2) **Basic Available-Light Shot II** is taught next because, once again, your camera and film are the only equipment necessary to bring back good pictures. (3) **Basic Direct-Flash Shot III** is a technique for shooting pictures where you must bring your own light for any special directional effect you desire. This provides sufficient light to increase the depth of field, because available-light shots usually provide only an *f*/2.8 (or wider) opening. You must have an *f*/8 (AV aperture value 6) to render sharp both the foreground and the background of an indoor shot. The only way to provide the necessary depth of field is to use your own direct-flash light. (4) **Basic Bounce-Flash Shot IV** creates a normal available-light effect by utilizing the ceiling of a room as a huge, widespread reflector. (5) **Basic Floodlight Shot V** provides complete lighting control for your picture because the floodlights show you not only where the shadows are but also the brightness contrast of your fill-in effect. (6) Finally, **Basic Closeup Shot Va—Closeup Portrait Lens Method**—increases the scope of a camera from subjects at infinity to as near as 4", while **Extension Lens Shot VIb** may be used up to 25X magnification. With your mastery of these six basic shots, you can shoot pictures anywhere at any time.

Carry your camera ready-loaded with flash. Then it becomes a simple matter to select the specific basic shot for any lighting and subject situation you will encounter. Once you have selected the shot, use the basic technique you have studied in these pages and shoot in confidence that you will secure a good picture.

Six-Basic-Shot Study Program

SUBJECT MATTER FOR BASIC OUTDOOR SHOT I:
- A trip to a zoo
- Children playing

BASIC AVAILABLE-LIGHT SHOT II:
- Eating at home
- An indoor stage play, circus, etc.

BASIC DIRECT-FLASH SHOT III:
- A table group
- Presentation of an award

BASIC BOUNCE-FLASH SHOT IV:
- A birthday party
- A social get-together or dance

BASIC FLOODLIGHT SHOT V:
- A child portrait
- An adult classical portrait

BASIC CLOSEUP PORTRAIT LENS SHOT VIa:
A flower arrangement
An insect

EXTENSION LENS SHOT VIb:
1:1 Bean
Magnify the edge of a stamp

The Criteria of Good Pictures

So many variables exist in teaching photography that a single simple thought must be the keystone for operating your camera; otherwise you will quickly become bogged down in mechanics and arithmetical difficulties which will make you a research engineer instead of a working photographer. The bedrock rule for you to remember, in judging the excellence of any picture, is this: *Is it sharp? And is it well exposed?*

This is the fundamental rule by which any picture is judged. Its artistic values are secondary because many of our pictures are made solely for record purposes of birthdays, news events, etc. where artistry is secondary to factual detail. Therefore, you will learn each of the basic shots with our shooting program so that your pictures will be both sharp and well-exposed. In addition, you will learn how to make interesting, well-composed, well-lighted, and color-correct pictures. In every case, the section on *theory* will tell you what should be done, and the section on *practice* will relate and co-ordinate your equipment so that you learn how to do it.

Finally, many charts and data are grouped in the Factopedia at the end of the book so that you can easily find any technical information you may need for the six basic shots.

Know Your Camera

You must know your camera perfectly. There are occasions, in shooting sports, news, dance pictures, etc. when there will be no time to check focus or shooting speeds or composition: you will be operating your camera by second nature. Using the camera continuously will automatically make you focus and expose correctly, but it does take practice. Therefore, after reading this book, select the projects for sharp and well-exposed pictures and shoot them. Mount the results in an album so that you can see the progress that you make and get into the habit of systematically filing your prints and slides as well. All pictures should be sharp, well exposed, and tell a story. Therefore, teaching you how to make sharp and well-exposed pictures with any camera model obviates the necessity of giving screw-by-screw descriptions of every model. Instead, you will be taught how each model should be focused for a sharp picture and how its exposure-setting controls should be operated for a well-exposed picture. (Incidentally, by learning this principle, you will be able subsequently to operate the old, the present, and any new camera

models that will be made because the manufacturers are always on the lookout to simplify any focusing and exposure setting that will ensure an easy method of securing sharp and well-exposed pictures.)

The teaching pattern will follow the program of showing you how to, (1) prepare your equipment, (2) practice with it for the six basic shots, and (3) apply it for future use.

When you acquire a new camera, follow our learning program. This shooting program is initially a practicing program because you can only learn by trying. Few photographers mastered their craft with a single roll of film! For this reason, expect to shoot a few trial rolls before you will actually get the "feel" that you know what you are doing.

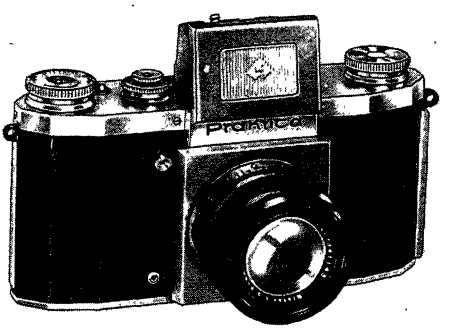
Photography, as well as any other decision-making art or science, requires familiarity with your equipment, your subject, and the results to be expected before you are certain of consistent results. Your camera must be a starting point for that familiarity because when shooting exciting pictures under stress you are going to operate it sometimes by reflex action alone. Therefore, acquaint yourself with its specifications.

The Praktica, Praktina, Pentacon, and Edixa single-lens reflex cameras have many points of similarity. In fact, together with the Edixa-Mat Flex, they have the same lens-mount specifications, so their lenses are interchangeable. It is possible to fit a Praktica lens on a Pentacon body, etc., or vice versa. A two-camera-body technique is helpful for shooting under a variety of conditions because one camera can be loaded with color and the other with B&W film. Therefore, consult your photo magazines and newspapers and buy a camera body that is compatible with your own lens-mount system when a fine offer appears.

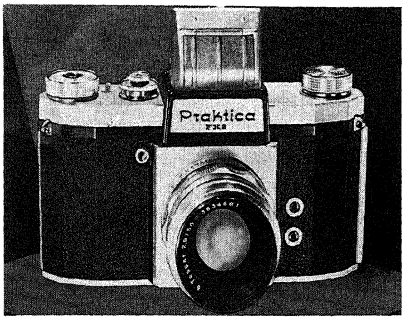
All models belong to basic single-lens reflex design VI.

Film size: 35mm film, sprocketed, in 20- or 36-exposure cartridges.

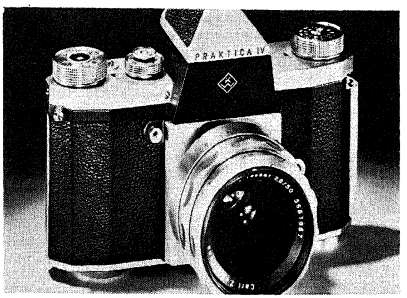
Negative size: 24x36mm (1x1-1/2").



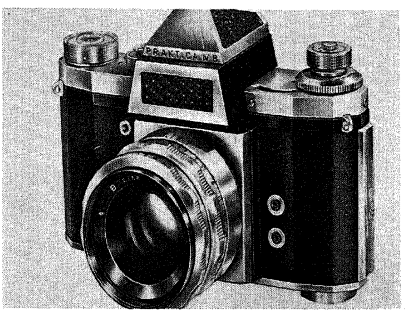
The Praktica I had flashlamp synchronization only.



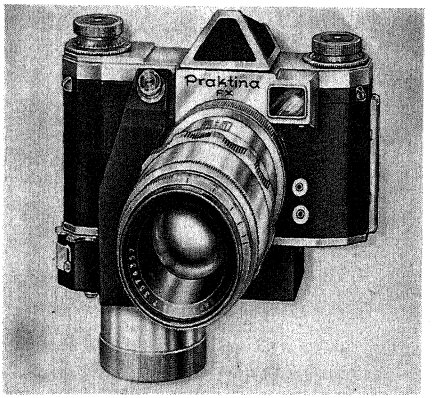
The Praktica FX2 has speedlight and flash-lamp synchronization sockets. The FX3 looks like this, too, but has a built-in release for a twist-ring, semi-automatic diaphragm.



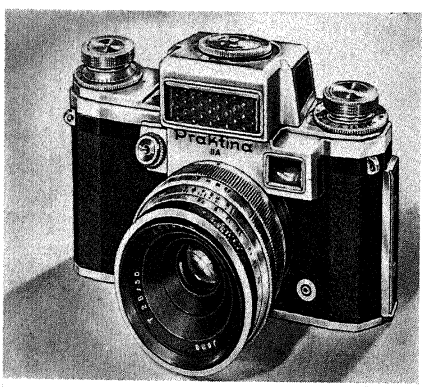
The Praktica IV has a fixed eye-level Penta-prism.



The Praktica IVB incorporates a built-in exposure meter.



The Praktina FX with the sequence spring motor.



The Praktina IIA with the built-in exposure meter.

Praktica Specifications

UNIQUE PRACTICA FEATURES. This manufacturer has been in business for over 30 years. The camera is rugged, low in cost, dependable.

Camera body: Die-Cast aluminum. FX, FX II, and FX III are fitted with a standard waist-level finder; FX IV and FX IVb with a fixed eye-level prism.

Film advance: FX, FX II, and FX III, by knob on top of the camera, which simultaneously resets the mirror, sets the shutter, and advances the film counter. FX IV and FX IVb have the above knob plus a rapid-advance lever on the bottom of the camera.

Lens bank: 50mm standard lens. Complete selection of focal lengths from 35 to 1000mm.

Lens mount: Special Praktica mount with 42mm thread. All Praktica models are compatible with one another.

A SHARP IMAGE. *Viewfinder:* FX I, FX II, and FX III waist-level finder with a built-in folding sportsfinder and an accessory eye-level prism finder. FX IV and FX IVb have only a standard eye-level Pentaprism finder.

A WELL-EXPOSED IMAGE. *Shooting speeds:* A coaxial dial control. The slow speed is set with a red mark to the index pointer for shutter speeds of 1/2 to 1/25 sec. and a black mark to the pointer for speeds of 1/25 to 1/500 sec.

Shutter cocking: Coupled automatically with the film advance.

Shutter release: Body release in front of the camera. Cable release opening in the body release.

Exposure-lens iris control:

1. FX I and FX II have standard preset iris systems.
2. FX III, FX IV, and FX IVb have a twist-wind-setting automatic diaphragm.
3. Meyer lenses with automatic diaphragms need not be wound. *Nonautomatic lenses should not be used on FX III, or FX IV unless the automatic diaphragm mechanism is disconnected.* It has to be placed in working order by pushing the red-marked knob to the left.

Flash terminals: PC Continental type.

Two-socket flash synchronization: An FP flashlamp socket for No. 6 focal plane lamps or M5, M2, or AG-1 flashlamps only, at all shutter speeds.

The Praktica I did not have X synchronization.

Speedlight synchronization from the X socket and the flash insignia on the shutter speed setting dial.

Accessories: Complete line from photomicroscopy to long telephoto lenses.

Twist-automatic-close extension tube operation. Special closeup rings marked "3" are the only tubes which will operate the twist automatic mechanism. A double cable release must be used; it operates the iris and the shutter release simultaneously.

UNIQUE PRAKTINA FEATURES. The Praktina system includes a sequence

motor (spring driven), a sequence motor electromagnetically powered, and an electromagnetic release, a wireless radio release effective within one mile, a 500-exposure magazine, and photomicroscopy and photomicrography accessories.

Camera body: The Praktina is a rugged, precision, die-cast aluminum frame. Praktina FX and IIa are fitted with an interchangeable waist-level or eye-level Pentaprism finder. Both Praktina FX and IIa have a built-in Newtonian optical finder for dim light where ground-glass focusing would be difficult.

Film advance: The Praktinas have a right-hand knob which simultaneously resets the mirror, sets the shutter, and advances the film counter. Praktina IIa features an instant-reopening automaic diaphragm. The film advance may be made also with the sequence motor drive or the electromagnetic power drive.

Lens bank: A 58mm *f*/2 is standard; a 50mm *f*/2.8 may be optional.

Lens mount: A special Praktina mount, which combines the advantages of bayonet and screw efficiency. Praktina IIa's instant-reopening automatic diaphragm does not operate with Praktina FX.

A SHARP IMAGE. *Viewfinder:* Waist-level finder has an interchangeable ground-glass. Special photomicroscopy ground-glasses are available.

The eye-level prism finder is supplied with a built-in optical range finder. This, too, may be replaced with a plain or the photomicroscopic ground-glass.

The Newtonian finder produces a bright image and is valuable for dim light or follow-action photography.

A WELL-EXPOSED IMAGE. *Shooting speeds:* A single speed-setting dial sets the range from 1 to 1/1000 sec., including B (bulb).

Shutter cocking: Coupled automatically with the film advance.

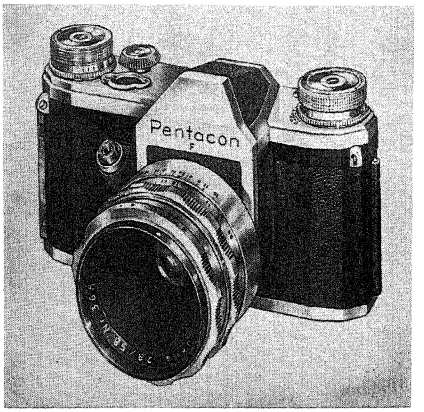
Shutter release: Body release at a convenient 45° angle in front of the camera. A cable release opening in the body release. Exposure lens-iris control: (1) Praktina FX standard lens is a cocking, automatic diaphragm in that the iris must be cocked to its widest opening for focusing. It stops down automatically when the shutter is released. (2) Prakina IIa has an instant-reopening iris which is opened automatically to the widest opening when the film is advanced. Praktina IIa lenses do not operate automatically with Praktina F.X

Flash terminals: PC Continental type.

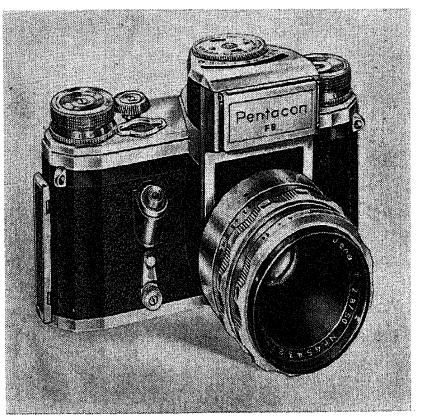
Two-socket flash synchronization: An FP flashlamp socket for No. 6 focal plane lamps or M5, M2, or AG-1 flashlamps only, at all shutter speeds.

Speedlight synchronization from the X socket and at 1/25 or 1/50 sec. on the shutter-speed setting dial.

The Praktina system is most versatile because of the accessories which will give you a large number of exposures for remote distance work, the radio-relay exposure control, and the host of accessories from photomicroscopy to long telephoto lenses.



The Pentacon F with a twist-ring, cocking automatic diaphragm.



The Pentacon FB with built-in exposure meter; similar to the Pentacon F otherwise.

The Pentacon Specifications

UNIQUE PENTACON FEATURES. The Pentacon system was one of the first to show the full potentialities of a single-lens reflex design. Pentacon accessories include the copying stand, a light-transmission box and transparency-copying device, a universal tripod of unique design, a chest pod which is practical for handholding telephoto lenses, photomicroscopy accessories, and open iris closeup devices designed for the automatic diaphragm so that the closeups may be focused with the iris wide open. This feature is invaluable for closeup photography because the lens extension lessens the amount of light reaching the film. Therefore, you can focus wide open and cannot forget to stop the lens down because of its automatic closing design.

Camera body: Rugged, precision, die-cast aluminum. Contax D and S, and Pentagon D, E, F, and FB, are single-lens reflex cameras with a fixed, noninterchangeable eye-level Pentaprism. Contax S was available without self-timer, 1/500 sec.; with self-timer, 1/1000 sec.; synchronization in tripod bushing. For a waist-level finder effect, Pentacon has an "angular finder" which is fixed to the regular viewing ocular. It may be rotated for "around the corner" viewing. It is valuable for focusing and composing ground-level subjects.

Film advance: The top knob of the camera simultaneously advances the film, the shutter is cocked, the mirror is swung into the viewing position, and the frame counter is advanced.

Lens bank: From 24 to 1000mm focal length, Pentacon F and FB have a twist-ring automatic diaphragm which is cocked by twisting the diaphragm ring. The shutter release automatically stops down the diaphragm to the pre-selected opening. The older Pentacon models had preset diaphragm lenses which were manually operated.

Lens mount: The Pentacon mount has a 42mm mount compatible with the Praktica and Edixa-Reflex and Edixa-Mat Flex series mount.

A SHARP IMAGE. *Viewfinder:* The Pentacon class prism finders are fitted with an ultrafine ground-glass.

A WELL-EXPOSED IMAGE. *Shooting speeds:* Button and speed-setting dial. A speed-selecting button reveals the speed scale disk which shows two groups — longer speeds marked in red and shorter speeds in black. The speed-selecting button is moved toward the left for the slow-speed scale. The desired speed is set by depressing and rotating the speed-setting knob.

Shutter cocking: Coupled automatically with the film advance.

Shutter release: Set conveniently at a 45° angle in front of the camera.

Exposure lens iris control: Pentacon F has a twist ring to set the automatic diaphragm. The older models were fitted with manual present diaphragms.

Single flash terminal: PC Continental type.

Flash synchronization: For flashlamp synchronization with No. 6 focal plane flashlamps or M5, M2, or AG-1 flashlamps, use the up-to-1/50 settings.

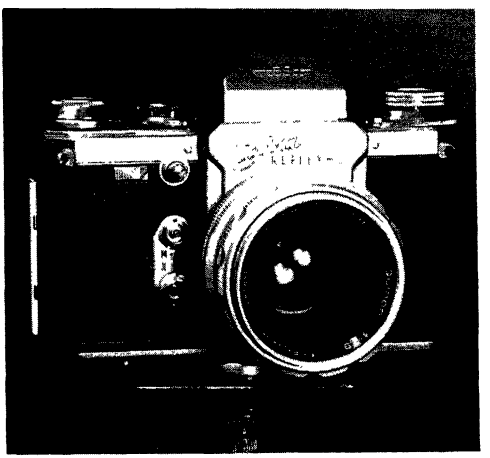
Speedlight synchronization: Use only the 1/20 setting.

The Edixa Family

Unique Edixa single-lens reflex family features four distinct divisions:

1. The Edixa-Mat Flex division is the first European single-lens reflex with an instant-return mirror and an instant-reopening diaphragm. It is available as Model B, which has a shutter-speed range from 1/25 to 1/1000 sec. and B.

2. The Edixa-Mat Reflex division Model C which is essentially Model B with a built-in photoelectric exposure meter. Model D has shutter speeds 9 sec. to 1/1000 and B. The Edixa-Mat Reflex Standard has a range of speeds from 1/2 to 1/500 sec. and is fitted with an automatic preset Steinheil six-element *f*/1.9. The special Edixa instant-reopening lenses will also open instantly with the members of the Edixa-Mat Reflex division. Older lenses will fit the Edixa-Mat Flex. The Edixa-Mat family has a film-advance alert system showing in the viewfinder. The ground-glass is removable for replacement with a rangefinder ground glass.



The Edixa-Reflex D one of the first members. The Edixa-Mat Flex is the first continental single-lens reflex with instant-return mirror and instant-reopening diaphragm.

3. Edixaflex Model A does not have the instant-return mirror. Shooting speeds are 1/25 to 1/1000 sec. Some models may have different speeds, as the Edixa cameras are sold world-wide and a different range of shutter speeds are often manufactured according to the needs of the country where they are sold.

4. The Edixa-Motor camera division. The Edixa-Motor camera is a single-lens reflex with a synchrocomport between-the-lens shutter. The camera is focused with the lens wide open. At the time of the exposure, the shutter blades close completely, the iris narrows to its preselected opening, the mirror swings out of the way, and the shutter opens and

closes for the exposure. When the film is advanced, the mirror is reset and the iris is reset to its widest focusing position. The Edixa-Motor camera is so-called because it has a completely automated exposure program through 18 exposure value numbers: a sensitivity range of 18 stops or 18 changes of equivalent shooting speeds. It is the first camera to have a completely automated exposure-setting program III with shutter speeds as slow as 1/30 to 1 sec. In addition, a freely selective time/lens-opening choice remains. In this way, should the automatic control read too slow a shutter speed, then you can unlink it and shift the EV numbers for a more desirable shutter speed/*f*/opening, etc.

Camera Body: The entire Edixa family is rugged. The Edixa-Mat and Edixa-Reflex division are fitted with interchangeable waist-level or eye-level Pentaprism finders. The Edixa-Motor camera has a fixed eye-level prism.

Lens bank: The Edixa-Mat and the Edixa-Reflex cameras may be fitted with focal lengths from 28 to 500mm and longer. Their lenses are compatible, as they have the same diameter and thread dimensions. The Edixa-Motor camera is fitted with a 50mm *f*/2.8 Xenar. A lens bank of 28 to 135mm is available. The Edixa-Motor camera lenses are not compatible with the Edixa-Mat and Edixa-Reflex bodies.

Lens Mounts: The Edixa-Mat and the Edixa-Reflex mount is 42mm diameter. Only the Edixa-Motor camera lenses fit this camera.

A Sharp Image. *Viewfinder:* The Edixa-Mat and the Edixa-Reflex have interchangeable waist-level and eye-level Pentaprism finders. The ground-glass may be interchanged with a rangefinder ground-glass. The Edixa-Motor camera has a fixed eye-level prism finder.

A Well-Exposed Image. *Shooting speeds:* The simpler Edixa-Mat and Edixa-Reflex cameras have shooting speeds from 1/25 to 1/500 sec. Some models have shooting speeds of 1/25 to 1/1000 sec. The Edixa-Motor camera has shooting speeds of 1 to 1/500 sec. and B.

The Edixa Reflex Focal Plane Shutter Setting Program (not for Edixa-Motor with Synchro-Compur between-the-lens shutter). Cock the shutter by flipping the film-advance lever and set the right-hand coaxial dials and/or lever for the following programs:

EDIXA FAST SPEED. The right-hand coaxial dial is used with the bottom dial set at 0. The top dial faster speeds are set by lifting and turning the speed opposite the red index dot.

EDIXA SLOW SPEEDS. Right-hand top dial at 1/25 sec. Bottom dial lever at 1/10, 1/5, 1/2 or 1 sec.

EDIXA B (BULB) SETTING. The B on the right-hand dial is set opposite the red index dot. The bottom dial lever is set at 0.

EDIXA LONG SPEEDS (2 to 9 sec.); when available on your camera. Left-hand lever at L. Left-hand setting dial is rotated anywhere from 2 to 9 sec. Right-hand top dial setting at B. Right-hand bottom dial setting at 0.

EDIXA SELF TIMER (delayed action), when available. Left-hand

lever at S. Left-hand dial set anywhere from 2 to 9 sec. Set for Edixa fast speed as above or set at Edixa slow speeds as above.

EDIXA LEVER AT R. If the lever R is brought to your left after the long speed or delayed action settings have been made, the gear train will be unwound without the exposure being made. Important in case you want to change the exposure setting or the delaying time or not use it entirely.

Caution: When any left-hand dial setting is made, release the shutter slowly. Doing so will ensure that the left-hand delayed action or long-speed controls will operate properly.

Exposure-lens iris control:

(1) The Edixa-Reflex may be fitted with a manual preset iris which permits wide-open focusing and stopping down by the touch of the fingers. (2) An instant-reopening iris automatically opens to the widest opening for focusing and narrows to the preselected opening at the time of the exposure. Edixa-Mat and Edixa-Reflex have compatible lenses which operate on the instant-reopening principle for both cameras. Edixa-Motor camera iris resets itself to the focusing position automatically, too.

Edixa-Mat – Edixa-Reflex flash terminals: PC Continental type. Two-socket flash synchronization and FP flashlamp socket for No. 6 focal plane lamps, or M5, M2, or AG-1 flashlamps only, at all shutter speeds.

Speedlight synchronization from the X socket at 1/25 or 1/50 sec. on the shutter speed-setting dial.

Edixa-Motor camera flash terminal: PC Continental type.

Single socket M-X lever control: The M control is suitable for all flash lamps with an approximate 20-millisec. delay (M5, M2, AG-1) at all shutter speeds. The X lever control permits speedlighting at *all* shutter speeds because it has a between-the-lens shutter.

All divisions have versatile accessories permitting photomicroscopy to telephoto lens photography.

STARTING OUT: B&W AND COLOR FILM BANK; LOADING THE CAMERA

Official Accessories

Only the manufacturers of the camera know the precision specifications of this camera, so for best possible performance from your camera, buy only accessories bearing their trade-mark.

Should the manufacturer not make a certain accessory that you want, then the reputation of the accessory manufacturer is important. Buy the best accessories you can, for the average accessory should last the lifetime of your camera. By amortizing any difference in price through the years, it will be seen to be negligible.

FILM-SPEED REMINDER. A loaded camera may be shelved and remain unused for some time. The name of the film and the camera in which it was placed may be forgotten, so that you have no way of knowing what a correct exposure should be. So set the film-speed index and fit the name tab of the film box over one of the snap buttons on the carrying case where you can see it as a reminder should more precise information about the film be needed. Some films may require different color-balancing filters with fluorescent light, etc. The specific film name eliminates this source of error.

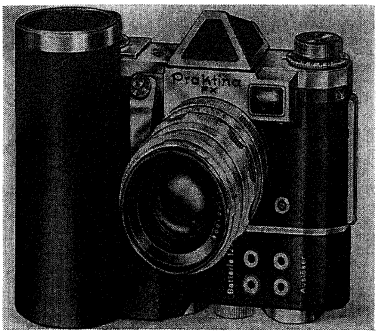
When you are in a foreign country and buy film calibrated in BSI or DIN ratings, you can convert this foreign rating into ASA with the conversion chart in the Factopedia. As an example:

ASA	APEX	BSI	DIN
125	5°	B33°	D23°

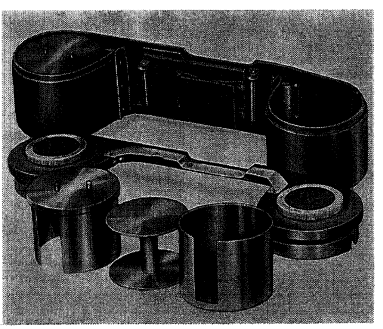
FILM STANDARDIZATION. One of the fundamental rules for camera operation is to standardize with one film, for standardization reduces the many variables present in picture-making which otherwise would be confusing if too many film speeds and to many different film characteristics were present.

COLOR FILM LIGHT-SOURCE BALANCING. Color film should be used with the light source for which it was designed. Daylight-balanced film should be used outdoors, Type A color film designed with photofloods (3400°K color temperature) should be used with these lamps. Type F color film designed for use with clear flash like the M5 flashlamp should be used with this lamp for best results.

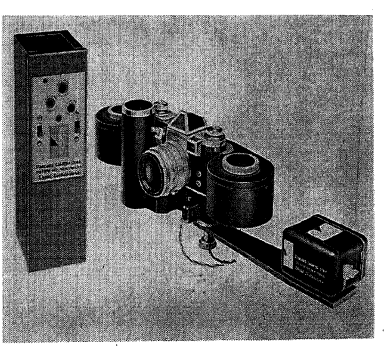
If, however, indoor color is in the camera and outdoor pictures are wanted, then a color conversion filter (see Factopedia) is needed.



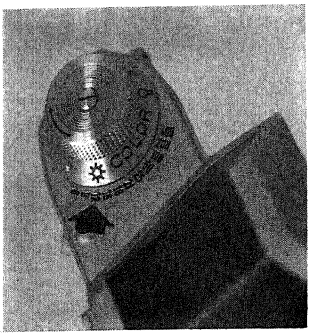
The Praktina FX with remote electromagnetic release.



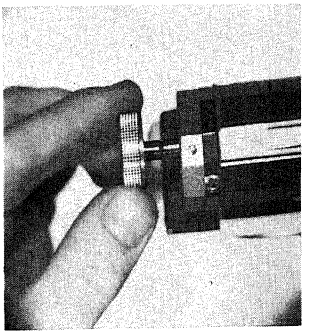
The 50′ magazine for the Praktina.



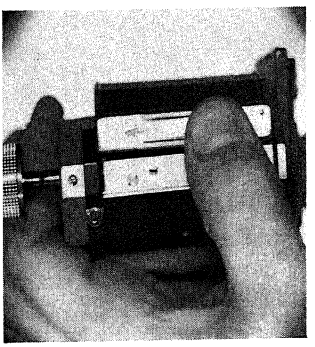
The Praktina set up for radio release with the 50′ magazine and the remote electromagnetic release.



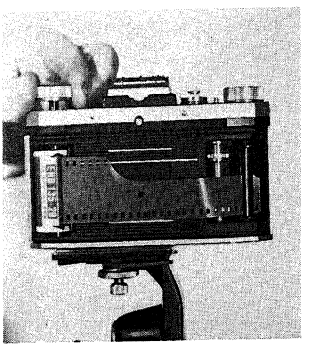
Set the film speed. Different cameras are used, but the principles are the same.



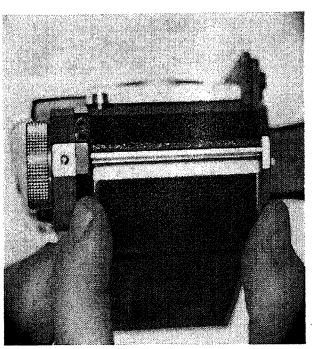
Lift the rewind knob



Open the back.



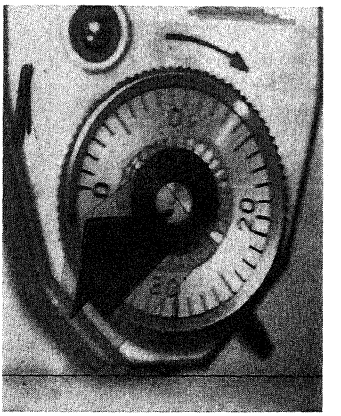
Secure the film leader. Secure the cartrige in the chamber. Press down the rewind knob.



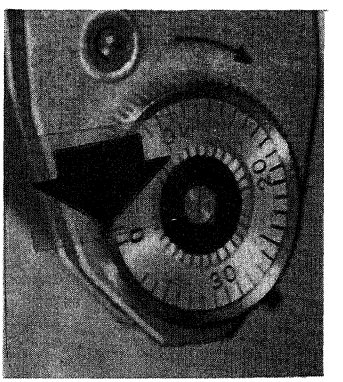
Fit the back or snap the back into place.

Press the release.

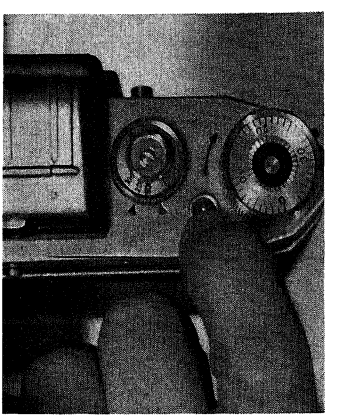
Set the counter before the zero.



The counter is at 1. You are ready.



After the film is exposed, press the counter release and rewind. The various models are constructed differently, but while the details may differ, the principles are the same.



PRACTICAL COLOR INFORMATION

The color fidelity of color pictures is easily achieved if you remember the one word: color-temperature balance. *Use outdoor color film outdoors because the color of the outdoor light matches the color balance of the film. In this way, no filters are required. Similarly, use Type F color film with clear M5 (etc.) flashlamps, so that no filter is required. The chances of making sharp pictures are improved whenever the lens is unencumbered by filters.* Better color pictures are possible for our (matching) various basic shots by observing color balance.

Color Temperature—A New Problem

Color film cannot readily do what your eye can do by being able to adapt itself automatically to outdoor light or indoor light. Color film must be made specifically for daylight purposes with sunlight or matched to tungsten illumination of a specific type. Color temperature is the quantitative number in degrees (°K) which fixes the color quality of the light in comparison with a heated black body.

There are 4 types of color film matched to 4 different color temperatures (*Daylight film,* 5500°K; *Type F* at 3800°K; *Type A* at 3400°K; and *Type B* at 3200°K). The color temperature of the light source must match the color temperature of the color film; otherwise, results will be too blue or too red. You must check the name of the color film to light the subject correctly. The new problem is only a minor one because the instruction sheet wrapped with the film usually tells you the color temperature balance of the film and the recommended light sources or filters which correct for it.

Because every filter prevents a certain amount of light from reaching the film, we compensate for this loss of light with the filter factor. The filter factor should be set immediately, as when Ektachrome Type F is corrected for floodlamps or for outdoor use with an 85C filter; Kodachrome, Professional Type with an 85A.

Color Basic Shot I. A daylight-type film should be used to match the color balance of daylight; a Skylight IA for a warming effect.

Color Balance for Basic Shot II. The available-light shot often produces better results with a daylight-type film. The reds appear more saturated, and the blues have a more vivid depth. Once again, no color filters are needed in front of the lens.

Basic Shot III. Color with direct flash requires careful matching of

the film to the light source if filters are to be avoided. With direct flash, then, a Type F emulsion should be used with Class M lamps.

Flashlamps No. M5 and M25 were selected because they synchronize with all shutters, they are very compact and powerful, are usually available everywhere, and the duration of the flash is 1/50 sec., which in itself will stop motion.

Flashlamp Synchronization (set at 1/25 for a No. M5). If the direct flash is taken with a speedlight, then the daylight color emulsion should be used because it matches the color balance of the daylight film.

Speedlights. A small speedlight is suitable for closeups 10′ or less because it is sufficiently powerful to permit narrow *f*/opening for a wide depth of sharpness. There are many variables in the use of speedlights. The suggested distances and *f*/openings work only with the unit mentioned. If your speedlight unit has the same guide number, it may only—and again, may not—perform the same way for you owing to the many variables. However, you must start somewhere, so begin with the same setting for a unit of the same guide number rating. In any case, read your instruction speedlight book thoroughly for its suggestions.

SPEEDLIGHT SYNCHRONIZATION (SETTING X ONLY). COLOR BASIC SHOT IV—COLOR BOUNCE PICTURES. A bounce shot, while easy to take with black-and-white film, has certain innate color complications which can be answered only after careful scrutiny of the following factors:

1. The color of the background.
2. The color of the wall and the ceiling.
3. The color balance of the film.
4. The color balance of the lamps.
5. The highlight-to-shadow lighting balance.

If the color of the background is unsuitable or underlighted, it may photograph an undesirable purple hue. If the walls and the ceiling are not white but pink or blue, this color cast will reflect from the face or the clothes of your subject. The results usually are not pleasing, but often you must take what you can get.

If the film has an outdoor color balance and the room lighting is very strong with artificial light, then the color will be far redder than you actually see.

If the color balance of the lamp is not matched to the color balance of the film, then the picture will also be too warm or too cold. Finally, if you catch your subject so that part of the face is in the shadow where the lighting balance will be too great, then the shadows will be much too dark or the color will not be true. Color balance should be practiced only in rooms that have light gray or preferably white ceilings or walls.

COLOR BASIC SHOT V—FLOODLAMP PICTURES. The light for the object is selected in this way: electronic flash or regular flash is preferred for living subjects, whereas photoflood lamps like the BFA-375 or even household lamps of 100-watt strength will suffice for inactive still objects.

Floodlamps that burn at 3400°K may be used with either Daylight Type +80B or Type +82A when the lens is fitted with appropriate

conversion filters. Remember—it is better to use indoor film outdoors than vice versa.

The Filter Chart in the Factopedia tells you what filters are needed to restore or match the color balance of the light source to the film.

Mixed Lighting on the Same Roll of Color Film. If Basic Shot I (the outdoor daylight shot) and Basic Shot III (color with direct flash) must be made on the same roll, then a compromise is required. It is wiser to use a color Type F and convert it to outdoor use than to try to use the Daylight type emulsion with Type F flashlamps. The reason is based on the fact that the conversion from the indoor to the outdoor type of light source hardly reduces the emulsion speed. However, when the outdoor type of emulsion is used indoors with a conversion filter, the film speed is drastically reduced by a factor of 4, which means that the *f*/opening must be increased 2 stops or the shutter speed slowed 4 times. Therefore, it is better to standardize with an indoor color film and convert it to outdoor use.

Do not mix indoor and outdoor lighting on the same shot as the film can do justice to only one color temperature.

Kodak High-Speed Ektachrome is the fastest color film, ASA 160, available without "pushing." It can be "pushed" to a rating of ASA 400 with special development. Ask your dealer for this service.

Colored Lights—Working with Colors

An entirely new field for projects is waiting for anyone learning to use colored lights. While photography originally started by making pictures with only the snap of the shutter, its new possibilities became stimulating. Colored lights offer another example of how one interesting problem leads to an array of new problems. Experiment with colored lights. You will be pioneering.

Color Psychology

Colors have visual emotional effects strong enough to make interesting, stimulating pictures from otherwise boring black-and-white versions. Differences in color can take advantage of psychological factors to add to a subtle final effect to the slide. These color differences are initially divided into the two basic groups of advancing and receding colors. The advancing colors, the yellows, oranges, reds, by the nature of their name, tend to be exciting, stimulating, disturbing. Calming to actually depressing moods are created by the receding group, ranging from green to purple.

ADVANCING COLORS (FOR FOREGROUNDS):

1. *Deep purple:* Mid-point change (changeover from receding to advancing).
2. *Red:* Violence, lust, love, vitality, fear, danger.
3. *Pink:* Femininity.
4. *Orange:* Warmth, magnificence, benevolence, plenty, harvest.

5. *Yellow:* Sunlight, aspiration, cheer, hope.
6. *Green:* Restful, germination, spring, new life (changeover from advancing to receding).
7. *Blue:* Calm, quiet, cool, distance-subduing, masculinity.

RECEDING COLORS (FOR BACKGROUNDS):

1. *Violet:* The unknown, the baffling.
2. *Indigo:* Discouragement, depression.
3. *Black:* Despair, the hidden, dignity.
4. *Brown:* Decay, aftermath of life.
5. *Gray:* Indecision, concern.
6. *White:* Purity, cleanliness.

To integrate these colors for their maximum photographic and psychological effects, carefully select the background so it enhances the mood of your picture. The color of a dress, the color of a tie, the color of the leaves of a tree can influence the emotional effect of a picture. One picture is supposed to equal a thousand words. A color picture can bridge bald, bare words with a rainbow of every stimulating emotion.

A SHARP PICTURE: HOLDING, FOCUSING, VIEWING

Requisites for Sharpness

HOLDING THE CAMERA. You are ready to take the camera in your hands to shoot your first picture. Correct camera holding is the first step to secure sharpness. The camera should be held squared to the subject, horizontally and vertically. The firmness of your hold, coupled with the smoothness of the shutter-releasing action, eliminates camera vibration as a cause of unsharp pictures. Hold the camera firmly, yet gently, with an expectant tension.

Fastest Shutter Speed—Sharpest Picture

Check your shutter-speed setting at this point. Set it at 1/125 or, even better, at 1/250 sec. These should be the minimum shutter speeds when the camera is hand-held. In fact, the main reason for using a tripod is to eliminate all possible motion in a hand-held camera, but even though a tripod-mounted camera produces sharper pictures, they will be less spontaneous than those of a hand-held camera. Therefore, by using the fastest possible shutter speed, you can approach tripod steadiness.

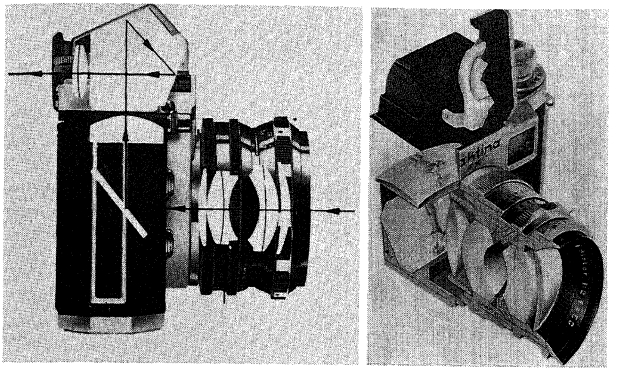
Format: Vertical or Horizontal

The 35mm size, 1 x 1½" format, is usually taken with a horizontal format for groups and with a vertical format for portraits, etc., for most efficient utilization of the picture area. There will be a further word of framing your picture within a 24x30mm format because that is the exact proportion needed to fill an 8x10" print.

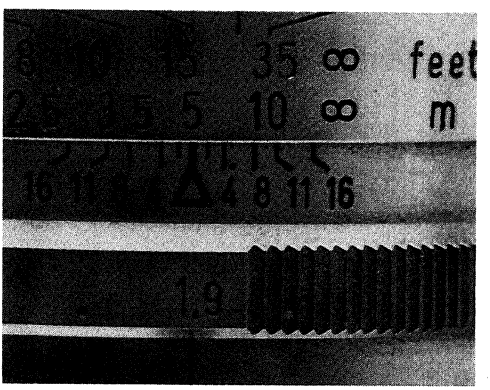
Practice holding the camera for both vertical and horizontal formats, remembering always to keep the camera case flap away from the front of the camera lens. Your pictures will be spoiled if you neglect this precaution.

The Ground-Glass and Viewfinder

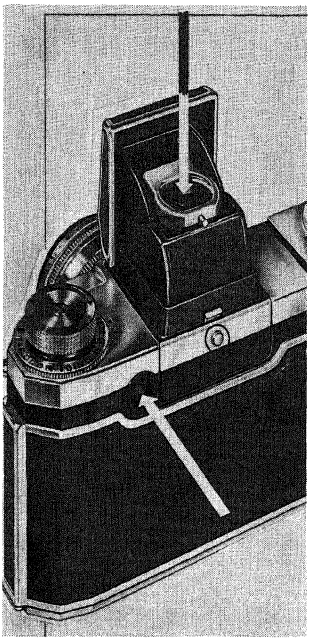
The ground-glass acts as a combined focusing rangefinder and viewfinder. It focuses as a rangefinder and acts as a framing viewfinder by showing what a contact print of the subject will look like. The focusing and viewing lens is the shooting lens, and therefore no viewfinder parallax exists.



Left: Waist-level finder of the Praktica. *Right:* The Penta Prism system shows an "as you see it" eye image.



The depth-of-field scale engraved on the lens shows the depth of sharpness; you do not need to consult table. At *f*/9 everything from 4¼ meters (approximately 14′) to 6 meters (18′) is sharp. At f/5.6 everything from 3¾ meters (11′)) to 8 meters (25′) is sharp, and at f/16 everything from approximately 3 meters (7′) to infinity is sharp.



Interchanging the Praktina viewfinder. The Newtonian finder is to the left. The bottom ring *must* be turned to ZU.

The Praktica FX3 (or older model) for eye-level sports viewing.

With the eye-level viewfinder, hold the camera at eye level. It is the eye-level viewfinder that made single-lens reflex photography popular. A chest-level finder means that your eye is directed downward toward a relatively small image. Even though you use a magnifier to enlarge the image, you will have difficulty because your eye will still be tilted downward. The eye-level viewfinder is based on a pentaprism that corrects the image reversal which usually occurs with a mirror-reflecting system. With the eye-level finder, viewing is comfortable, and the magnification system built into it permits almost 1:1 life-size viewing. No eye-strain results from looking at the ground-glass image. At eye level, you can keep both eyes open and see the area around the subject before it enters the field of view of the shooting lens.

For low subjects, fit the right-angle finder to the eye-level viewfinder or interchange the Praktina, Edixa-Flex, and Edixa-Mat Flex for a waist-level finder.

Wide-Open Focusing

The lens that focuses the picture is the lens that shoots the picture. *This is important,* because a lens should be focused at its widest aperture. For single-lens reflex photography, if the exposure is made at the widest aperture, no problem exists. However, if the lens aperture must be closed from the widest to the narrowest opening when the exposure is made, then this has to be done rapidly so as not to lose the picture. It must be done without jarring the camera; otherwise, camera motion will be present and the picture will be unsharp. It must be done effortlessly, for the same reason.

The following four methods have been developed to avoid these problems:

1. OLDER LENSES WITHOUT ANY PRE-SET DIAPHRAGMS: These focus and shoot at the aperture that ultimately will be used. This is the crudest method, but it was used by sports photographers, for example, who can't take the chance (while focusing and composing through the lens) of guessing at the exposure stop-down point with non-preset diaphragms, although it is possible to focus at the widest aperture and then stop down.

2. A MANUAL PRESET EXPOSURE STOP: A mechanical stop is built into the aperture ring so as to permit wide-open focusing; then manually twisting the aperture ring stops it at the point of the pre-selected aperture. This is done smoothly without removing the camera from the eye. A too vigorous twist could turn the lens mount and change the focus of the lens.

3. A COCKING AUTOMATIC DIAPHRAGM like the Praktina *f*/2, Brotar, 58mm, etc. which is used in a two-step procedure. In the first step, you must cock the automatic diaphragm to its widest opening after the preselected aperture opening has been decided on. In the second step, the iris is automatically rotated to the preselected aperture opening at the time the shutter is released.

4. Instant Reopening Automatic Iris with Praktina IIa, the Praktica with Meyer lenses or the Edixa-Mat Flex with instant-reopening lenses. This mechanism permits wide-open focusing. Its design allows preselection of the ultimate aperture at which the exposure will be made. In addition, the lens reopens automatically to the widest opening for focusing, stops down automatically after the exposure is made, and instantly and automatically swings wide open after exposure. It is the ideal method because you don't have to worry about remembering to stop down by guesswork or to preset a stop manually before exposure. The latest models are fitted, or are being fitted, with the instant, automatic-reopening type of iris.

Critical Focus. The ground-glass is the best way for checking critical focus because it shows you whether you are sharp or unsharp. The lens, of course, should be focused wide open, because a bright image is much easier to judge for sharpness than a dimly lighted image.

Rangefinder ground-glasses are desirable when the subject has clearly defined lines or contrasts for focusing.

Depth-of-Field and Hyperfocal Distance. The ground-glass may not be of much use in seeing the depth-of-field or the hyperfocal distance because, at *f*/16, for example, when the distance scale has been set at 13', everything from 6-1/2' to infinity is sharp. If the focus is checked with the ground-glass at the widest opening, there will be little indication to show the ultimate range of sharpness. If the lens is stopped at *f*/16, it will still be visually difficult to see the range of sharpness. Therefore, the aperture is preset at the narrower opening and the ground-glass serves merely as a viewfinder and for composing the subject. "Previewing," the ability to see the stopped-down effect, is possible with some automatic lenses and with the manual or manual preset lenses. A preview may make you realize that a too sharp background may compete with your subject and so indicate the necessary corrective measures.

Focusing Practice Review.

1. Use the fastest possible shutter speed to ensure the sharpest hand-held picture.
2. Use the ground-glass and/or the rangefinder prism effect if your ground-glass has one for critically sharp focus.
3. Refer to your depth-of-field and hyperfocal distance settings for subjects that have an extended depth.
4. Preview, with models that have it, to see the actual range of sharpness.
5. Shoot within preselected distances, whenever you can approach your subject, to fill your frame for better composition.

A WELL-EXPOSED IMAGE

The Secret Word for Better Exposures

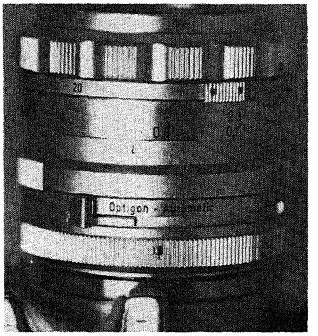
Correct exposure is probably the number 1, always-present problem, as some compromise usually must be made since the film emulsion cannot record exactly what your eyes see. Therefore, you must make your decision, when setting the exposure, as to which black-and-white tones or which colors are to be accented. The decision-helping secret word is, *significant.* On account of the film emulsion's limitations, you must decide the "significant" black-and-white tones or significant colors which are to be recorded properly. An example, for an easy start in decision-making, is a frontally lighted landscape wherein the sun is behind your back. The light is uniform throughout the subject and there are no significant shadows or significant highlights. Therefore, your exposure setting is made as read from the chart in this section.

A sidelighted subject or a backlighted subject will have shadows in it. The shadows may be insignificant and your exposure can be set as the meter reading indicates. When shooting a person who is sidelighted or backlighted with the face in shadow, and shadow detail must be revealed, for example, then the shadow side becomes significant and has to be filled in by a reflector or fill-in flash, or manipulated with black-and-white film by an extended exposure and limited development system.

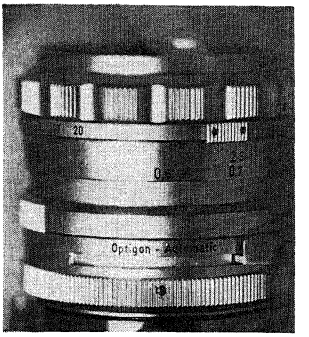
The sun, in a sunrise or sunset, is the most significant highlight. The exposure must be compensated to reveal some of its detail by using a faster shutter speed or by narrowing the lens iris one or two stops; otherwise the resulting picture will look like a midday shot.

USING THE SECRET WORD: SIGNIFICANT. The basic meter-reading techniques remain the same. Now look for and compensate for the significant highlight or the significant shadows.

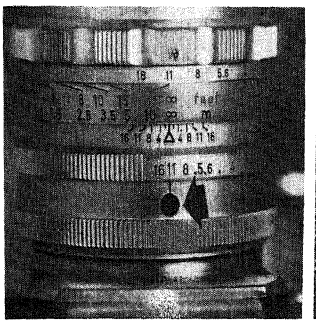
You may have often tried to duplicate exposures that you read about in books and were not successful in doing so. The error may have been caused by your not knowing whether the lighting was from front, side, or back. You know that exposures may differ because of the lighting position and of the presence of significant highlights and significant shadows. So, increase your chances for a better exposure by taking your main light reading and then determining whether your subject is lighted from front, side, or back, so that you can make the necessary setting.



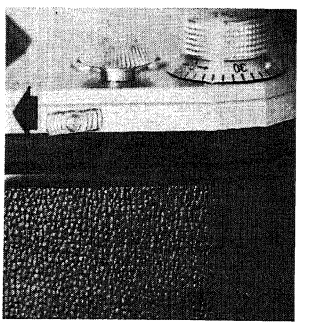
The Pentacon with f/1.9 cocking automatic diaphram in unset position.



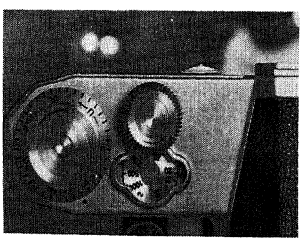
The Pentacon automatic diapragm has been cocked.



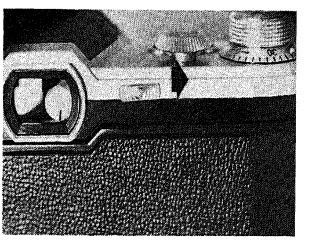
A red dot appears, indicating the diaphragm is cocked.



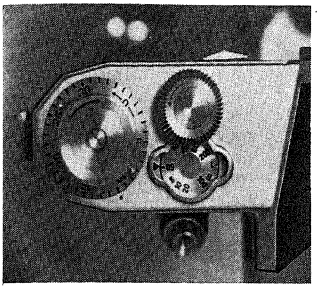
Pentacon slow speeds. Shift button to left.



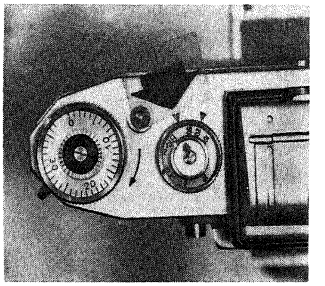
Align slow speeds opposite red pointer at the left.



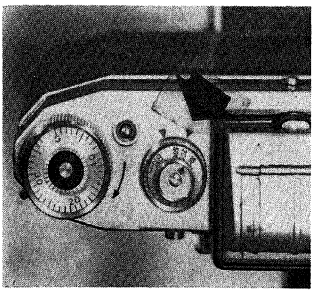
Pentacon fast-speed-shift button to the right.



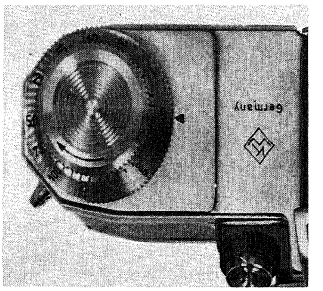
Read Pentacon fast speeds opposite black index point to the right.



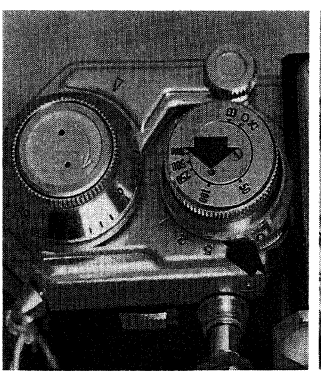
The Praktica coaxial dial is set opposite the red index mark for slow speeds.



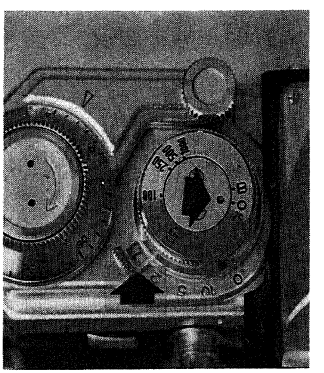
The coaxial dial index is set opposite the black mark for fast speeds.



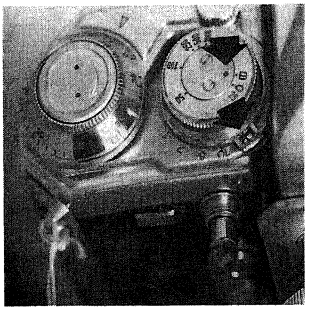
The Praktina has a single-dial shutter-speed setting control.



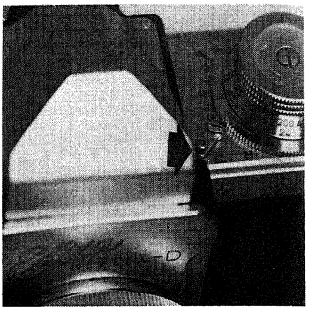
Setting the Edixa fast speed.



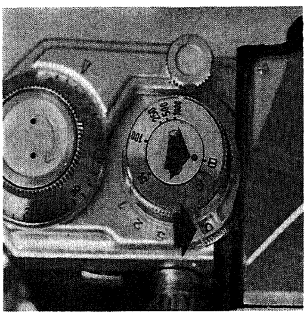
Edixa slow speeds.



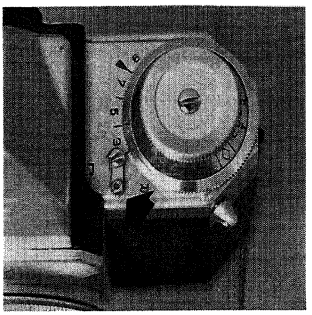
The Edixa B (bulb) setting.



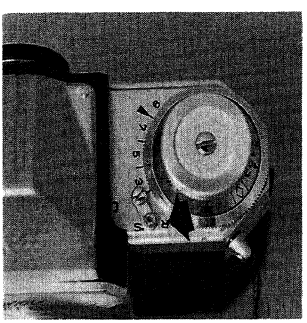
The Edixa long speeds with left-hand lever at L.



Edixa long speed, right-hand dial as seen.



Edixa self-timer, left-hand lever at S. Follow self-timer program for Edixa fast or Edixa slow speed.



Edixa lever at R.

The Praktina's ground-glass rangefinder out of focus. When the image is complete, the subject will be in-focus.

EXPOSURE-SETTING PRACTICE

The importance of reading your subject brightness directly with reflected light, indirectly by measuring the main light falling on the subject by incident light, or with a combination of both, is explained under the various light-reading techniques in Part II and in the Factopedia. Now follow this procedure in practicing a standardized technique.

1. Check the film index from the film instructional sheet and set the film-speed index for the camera exposure meter, the accessory exposure meter, or the film-speed reminder dial.

2. Secure an exposure-meter reading from the instruction sheet, with the accessory exposure meter or with the built-in meters of the Praktina IVb, the Praktina IIa, the Edixa C series, or the Pentacon FB by the Reference Main-Lux method, as a. main light estimation for a lens-opening—shutter-speed value. Practice with these techniques and make the black-and-white tone or color compensations.

3. Transfer this reading to your camera exposure-setting controls. Keep the lens opening at its widest if there is no preset selector. Preselect the lens opening if a preselector ring exists. Use the cocking lever if the lens is manually automatic, and set only the needed *f*/opening with the self-setting automatic lenses. The shutter speed, of course, should match the exposure setting indicated by your exposure reading.

4. Use wider openings for faster shutter speeds or narrower openings for longer shutter speeds, depending on the photographic effect needed. If a choice is immaterial, then use the fastest shutter speed. This completes the second condition for an excellent result, a well-exposed picture.

BASIC OUTDOOR DAYLIGHT SHOT I

The theory for shooting Basic Daylight Shot I is given in Parts II and III, Fundamentals and Factopedia. It suggests a series of pictures at various set distances. These distances are also the pre-set distances for Basic Direct-Flash Shot III.

In addition to shooting the basic distances, try a shot requiring a depth-of-field setting. This will increase your awareness of how the focusing procedure can be used creatively. Most fine pictures require critical focusing, but you will find that your ground-glass and/or microprism are capable of attaining a high degree of efficiency in this respect. Moreover, by shooting a depth-of-field picture, you will be learning a bit more than merely acquiring a system of picture-taking by rote. Obtaining creative effects is possible only through practice.

With wide-angle and telephoto lenses, you will have a flexibility of subject distance and subject size that will make your pictures more interesting. The scope of your subject matter then becomes unlimited. However, regardless of focal length, you must always keep in mind the question and answer as to whether your pictures are sharp and well exposed. Fill your frame for greater effect in telling your story.

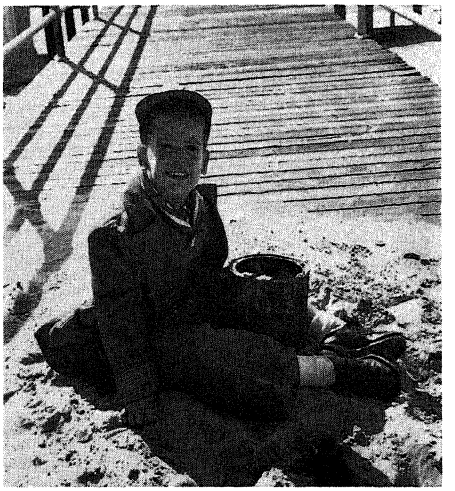
Using the Depth-of-Field Scale

The rapidly changing subject matter met in travel or in action photography precludes focusing and refocusing for every subject. Under such conditions you can use your depth-of-field scale very effectively by adopting a three-distance setup:

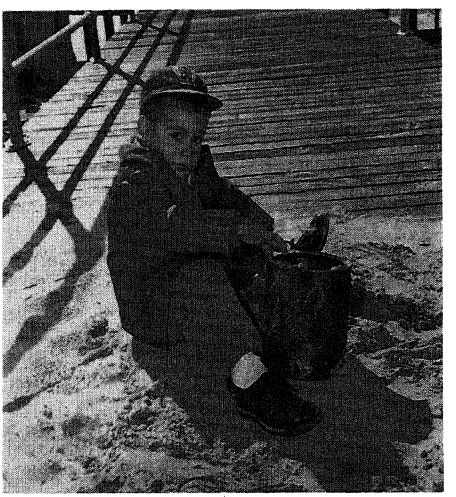
1. *Use 5′ (1.7m) for half-body size portraits.*
2. *Use 10′ (3m) for full-body size shots.*
3. *Use 30′ (10m) for group and landscape subjects.*

By pre-setting, you will get your picture because you'll always be ready. And you *must* be ready because the action or movement may be so swift that you will not have time to focus.

When the subject is backlighted and has significant shadows requiring detail-brightening with fill-in speedlight flash, the following chart is applicable if the flash is fitted with 3 flipover thin white handkerchiefs or diffusion plastics for reducing the amount of light as you approach the subject. The amount of light must be reduced through a diffusion cloth or plastic because the X synchronizing shutter speed is 1/60. As the synchronizing shutter speed is fixed, the only daylight exposure



Significant shadows in this closeup are backlighted.



The flash fill-in brightens the shadow fully.

variable is the iris *f*/opening. As the flash must be balanced to this iris opening, it can be reduced in intensity only through handkerchiefs or plastic shields because a change of iris opening would change the over-all daylight exposure. The speedlight (like an Ultrablitz Monojet) with a guide number of 25 with Kodachrome, Daylight Type, based on a fill-in ration of 1:1/2 is used for the chart.

Daylight *f*/opening		*f*/8	*f*/6	*f*/4	*f*/2.8
Body Size	*Distance*	*Fill-in Flash Makeup with Ultrablitz Monojet*			
Full body	10 Vert.	N.R.	N.R.	Flash alone	Flash + 1 TWH
¾ body	7 Vert.	N.R.	Flash alone	Flash + 1 TWH	Flash + 2 TWH
½ body	5 Vert.	Flash alone	Flash + 1 TWH	Flash + 2 TWH	Flash + 3 TWH
H&S	3½ Vert.	Flash + 1 TWH	Flash +2 TWH	Flash + 3 TWH	Flash + 4 TWH

(TWH means a 50%-reducing thin white handkerchief or plastic diffusing material.)

AG-1B lamps have the same guide number with Kodachrome Daylight at a synchronizing speed of 1/60, but the F (flash socket) is used.

A CREATIVELY DIFFERENT PICTURE

D—Difference

To give a picture impact, make it *different*. The human mind must have some point of attention, a point of dominance—a point of attention isolation; otherwise, it wanders and loses interest. For this reason, there must be a difference—a point of dominance to make you want to look at the picture at least once, while if it is a real eye-stopper it will make you look at it twice or more.

The creation of a difference, no matter how slight, is certain to arouse attention. Differences often are easily created. Here is how to do it in one way: place a black dot on white paper and it becomes a point of attention. In reverse, placing a white dot on a black field likewise attracts the eye.

What have you done in these examples? You have taken the monotony away from a subject by creating a difference. It is the difference that prevents boredom; it is the difference that will make your pictures become eye-stoppers. Creating differences of many types is accomplished easily if you know what to look for. Purely photographic-effect differences may exist, such as out-of-focus backgrounds due to your point of focus; stop and blur motion, because of a slow shutter speed; or tonal differences with or without filters. You must bring them out on film for the best effect. You must know photography for this. Other differences are subject-created differences, as when a sports event is in progress, when news events are in the making, when your subject is doing something out of the ordinary. Again, you must wait for the real difference to appear—then snap it. Here, psychology and common sense are plentifully needed. The more usual types of differences often encountered routinely are:

PHOTOGRAPHIC DIFFERENCES:

1. Differences in film emulsions: black-and-white, color, infrared, positive film.
2. Differences in image size: how near, how far, wide-angle, normal, telephoto.
3. Differences in angle of view: high, eye-level, low, side, back, front.
4. Differences in sharpness: over-all sharpness, selective sharpness (subject and/or background and/or foreground in focus), wire sharpness.
5. Differences in motion: stop, blur-stop, blur, selective motion, split motion.

6. Differences in light source: point, semidiffused, diffused types of light.

7. Differences in lighting contrast: uniform, contrast ratios of 2:1, 4:1, or more.

8. Differences in development contrast.

9. Differences in composition placement.

10. Differences in design, pattern.

11. Differences in high-key, middle-key, and low-key lighting. Low-key pictures usually are made with only one lamp, no fill-in; medium-key at 1:4 to 1:8 ratios; high-key at 1:1 ratios with as uniform illumination as possible.

12. Differences in color (hue) contrast of subjects or lights.

13. Differences in tone that filters can reduce or create contrast with various colors.

14. Differences of highlight and shadow ratios as the film sees it.

SUBJECTIVE DIFFERENCES:

1. Differences of size: as a baby's hand holding an adult's thumb.

2. Differences in sex: a single boy among a group of girls.

3. Differences in emotion, expression.

4. Differences of action and reaction.

5. Differences of age: a child among an all-adult group.

6. Differences of the known (a famous personality) from the unknown (crowd).

7. Differences of various peaks of effect as motion (a batter swinging) or emotion (a child crying).

Any difference will create initial interest. You must see it and put it on film.

This series would make a wonderful project for illustrating these themes. You will really learn, then—the only way, the best way—by doing it yourself.

E—Emphasis

Locating a difference, after a little practice, becomes easy. However, how to make your film see what your mind thinks becomes a challenge to your skill. Emphasis of our difference can be broken into types that are (1) photographic and (2) subjective.

Both must be blended for effective results. The balance from one to the other can shift quickly, so you must always be alert.

1. Photographic emphasis may take form in the control of lighting, filter, diffusion, taking angle, etc., to make the subject stand out from its surroundings.

2. Subjective emphasis is produced by the expression, clothing, appearance, construction, etc., of the subject.

The lovable expression of a child can create far more emphasis than any spectacular photographic lighting technique.

First, you must study your subject. Select the applicable basic shot. Then decide what must be done to emphasize any difference that exists or can be brought to prominence by technique. A difference must be emphasized; otherwise, your picture will be just ordinary.

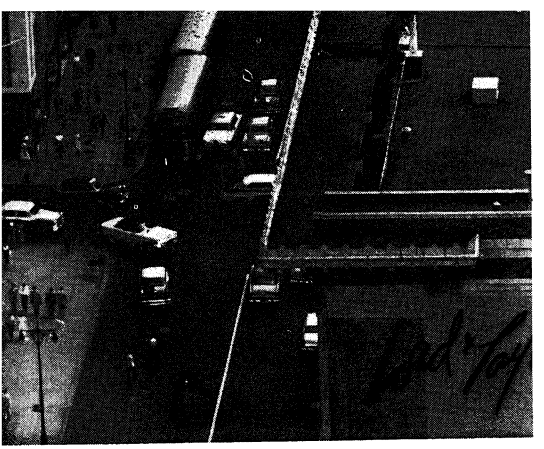
A—Arrangement

Place your subject in a pleasant spatial presentment.

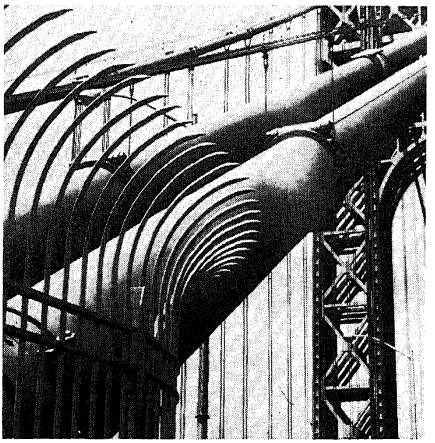
Composition is the subject's arrangement in a pleasing manner within the framed border of your film. Much can be written, but it all boils down to getting when you can as best you can. The painter has far greater freedom because he starts with a blank canvas and arranges his subject where and how he wishes, often disregarding perspective. The photographer must take life as he finds it. He cannot move mountains for better compositions; cannot drain lakes if the shoreline is in the wrong place. A sure-fire help for better arrangement is to divide the viewfinder into thirds and place your object, which shows the difference that you are emphasizing, at one of the divisions in the frame. This will usually ensure a dynamic, interesting composition.

R—Recheck

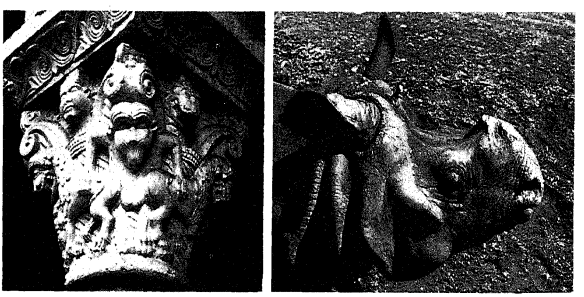
Remember to check your setting for every picture. A painter can take years to paint his picture. On the other hand, the photographer often has only one opportunity to snap his picture.



A birds-eye viewpoint changes the appearance of familiar landmarks.



Pattern shots are everywhere.



Many DIFFERENCES are ready made.

WIDE-ANGLE AND TELEPHOTO LENSES FOR BETTER PICTURES

Advantages of Interchangeable Lenses

Difference of subject size was considered as an interest creator in the preceding discussion. Securing a difference of subject size is easy when interchangeable wide-angle and telephoto lenses are used. For instance, if you want to take a picture of an entire room, you can do it only with a wide-angle lens, because with the ordinary camera lens you cannot move back far enough to include the entire room.

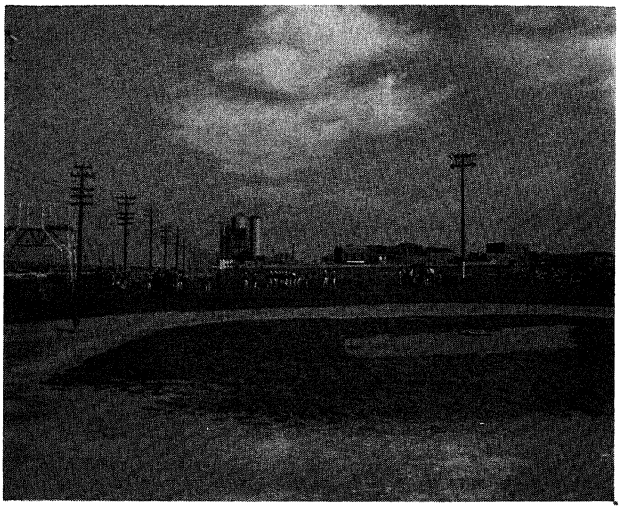
Similarly, when you are distant from your subject (such as sitting in the upper stands at a boxing bout or ball game), the telephoto lens must be used to secure a usable, large enough image.

These lens accessories are the only way to overcome the limitations of your regular camera lens. The wide-angle and telephoto lenses must be used to make these differences possible.

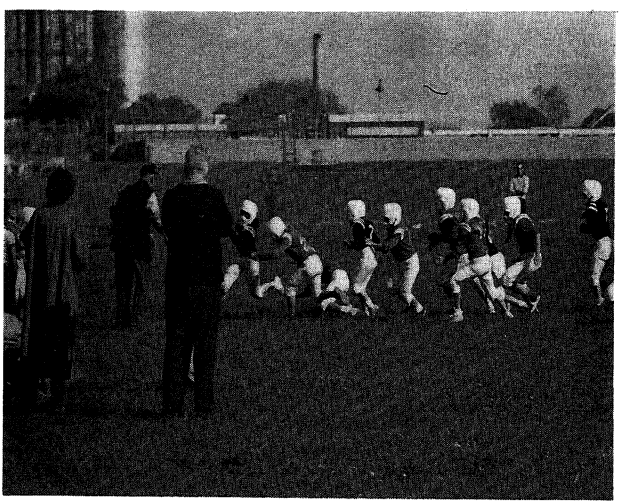
The interchangeable lens feature of these single-lens reflex cameras permits them to do almost everything! Regular photography, photomacography, photomicroscopy, and wide-angle and telephoto photography are but a few of the branches readily possible because of lens interchangeability. The single-lens reflex design is logical for wide-angle and telephoto work because the single-lens reflex ground-glass includes all your subject, for any focal length. Therefore, there is no need for special auxiliary viewfinders. Many rangefinder cameras able to interchange lenses can accept lenses from 35 to 135mm focal length to couple to the rangefinder. Many have viewfinder provisions for outlining the field-of-view of lenses from 35 to 135mm focal length by means of brightline masks which may be parallax-corrected. However, lens of shorter or longer focal length require special viewfinders (which add a time-consuming step in picture-taking, in addition to having to check their own parallax), or they may be provided with a special reflex housing which must be assembled or disassembled when long focal lengths are replaced by short focal lengths. The single-lens reflex design obviates the added steps because its ground-glass is actually a universal, parallax-corrected, same-size viewfinder for all focal lengths at all distances.

INTERCHANGING LENSES. The accessory lenses are interchanged by unscrewing the normal lens counterclockwise, removing it, and then seating the new lens or attachment on the mount, rotating it clockwise until the thread engages. The lens is then rotated until it is fitted securely.

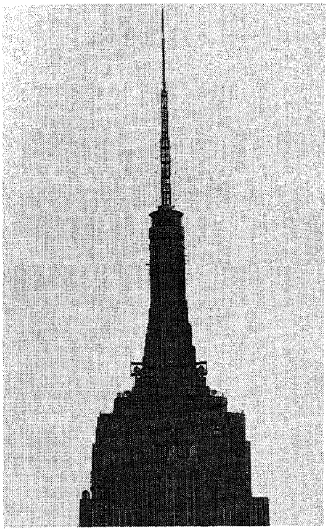
In the Praktina system, a combination of screw and bayonet fitting features are combined.



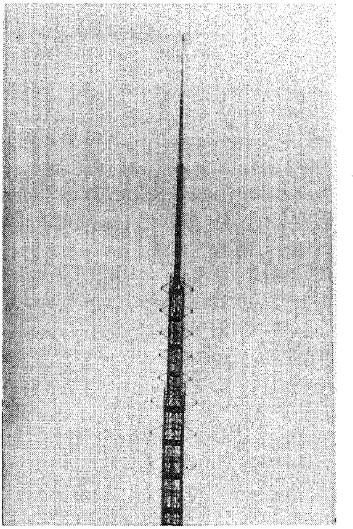
Comparative view of the 35mm focal length of a football game.



A 180mm lens was used from the same distance.



The Praktina with a Tele-Megor 180mm.



The Praktina with a 400mm Tele-Megor taken from the 49th floor at 42nd Street and Fifth Avenue, New York.

The Wide-Angle Lens

The standard camera lens has its limitations because you are rigidly bound by what *it* can see. As an example, if you wish to take an entire room or an entire table indoors, you cannot usually do so because your regular lens forces you to stand so far away from the subject that you literally would have to go through the wall in order to encompass it entirely. Your camera, fortunately, can be equipped with an entire replaceable prime lens to produce a wider angle of view so that you can take in more of the same subject at a near distance. The standard lens usually has an angle of acceptance of 45°. Wide-angle lenses, as you can presume by now, are made according to special-formula computations so that they show more of the subject and are designed to cover a larger area than would normally be expected at the near focal length.

By definition, a normal lens is one whose focal length is the same as the diagonal of the frame. A 45mm, 50mm, or 58mm lens is considered "normal" for the 24x36mm format. This means that when the lens is placed approximately 50mm or 2″ away (for example) from the film, the circular image cone which it projects will cover the entire frame sharply from corner to corner.

THE 35MM WIDE-ANGLE LENSES. An ordinary prime lens of 35mm focal length, as an example, is placed 35mm from the film for infinity focus. Unless it is a special wide-angle formula its circle of light will *not* cover the

entire frame. Modern 35mm cameras have had special lenses of 35mm length computed for them. These *will* cover the entire frame. In fact, there are ultra-wide-angle lenses which stand only 21mm (approximately 4/5″) from the film, and yet their almost miraculous formula uniformly covers the entire frame.

The most popular wide-angle lens has a 35mm focal length. In fact, it has practically become the so-called normal lens for indoor shooting because the usual near 10′ to 12′ distances necessitate a wide-angle lens in order to see approximately what your eye considers the most important parts of the subject.

Starting with a 35mm wide-angle lens, the illustrations show how the subject area becomes smaller and the image size larger as standard lens focal length is approached. The next picture group demonstrates how telephoto lenses show more and more of less and less for actual image enlargement from the same viewpoint.

A 24mm wide-angle lens to fit the Praktina, Pentacon, Edixa-Flex, and Edixa-Mat Flex is available.

Wide-Angle Lens Review. The advantages of a wide-angle lens are:

1. It can show an entire room from one average distance position.
2. It decreases background size in relation to the main object so that the near object appears larger than usual. Its perspective expands the foreground in relation to the background.
3. Its shorter focal length increases the depth-of-field sharpness so that a much sharper image can be secured at the same *f*/opening than with a similar *f*/opening of a lens of longer focal length.
4. It can be used preset so that everything will be sharp from 7′ to infinity with the focus at 15′ and an opening of *f*/6.3 or narrower.

If we ask ourselves how our wide-angle lens will produce a sharp image and a well-exposed image, the above factors become apparent.

Telephoto Lenses

A telephoto lens shows an enlarged image from the same viewpoint of part of the area taken with the normal lens. A telephoto lens is most valuable for bridging rivers, streets, or mountainous areas—and for portraiture because it avoids facial elongations. For any indoor sports or press photography where the photographer would interfere with subject or audience because of his presence, they are invaluable.

Telephoto lenses, too, must have a special formula because a regular lens of long focal length, like a 5¼″ (135mm) or 10″ (250mm) lens used for larger cameras, is not sharp enough to withstand the enormous enlargements we usually make with 35mm film. For this reason, buy the telephoto lens that is specially designed for miniature camera photography. Do not take a lens from a large camera and try to adapt it to 35mm use.

Long Focal-Length and True Telephoto Lenses. A long focal-length lens is one whose infinity point measured from the film plane is its actual focal length. Therefore, a long focal length of 10″ will be 10″ from the film

plane. A true telephoto lens has such a compact design that a lens of 10" focal length may only be 5" to 7" in mechanical over-all length from the film plane.

DISTANCE CAPACITY OF TELEPHOTO LENSES. Telephoto lenses literally have no bounds because those available have focal lengths up to 1000mm (a 20X magnification over the regular lens) and can even be used with telescopes to increase their enlargement effects. But the problems connected with obtaining a sharp image and a well-exposed image exist here as well. With telephoto lenses, however, rangefinder cameras have viewfinding and parallax correction problems which are acute because the camera viewfinder no longer shows the field of view for either the wide-angle or the telephoto lens. They must have an auxiliary viewfinder for this purpose, which creates even more parallax because it usually stands above the top of the camera. For this reason, most interchangeable-lens rangefinder camera manufacturers have produced a reflex housing for telephoto lenses or have gone to the extent of producing single-lens reflex attachments to solve these problems. Your camera, being a single-lens reflex, sees nearly exact film-image size because the ground-glass is a combined rangefinder, viewfinder, and composing aid.

The Telephoto Lens Effect

When we are standing on a spot where we cannot move backward and want to take a picture of a large area, a wide-angle lens is used. Now, a little later, suppose you are standing in the same spot but find that you cannot move forward, not even an inch, yet you want a larger image of a smaller portion of the scene. A sea gull, for example, sitting on a distant rock. While it is true that your picture could be enlarged, a sea gull image in an over-all shot taken at 25′ to 50′ distance is so small that the immense enlargement necessary for the blowup will show grain and a general loss of sharpness and picture quality.

Telephoto lenses were designed to produce larger images of relatively small objects when shot from the same distance as the standard lens. A telephoto lens is immensely popular because of these advantages:

1. The image size is increased without your having to move nearer the subject.

2. The background, in proportion to the main subject size, appears larger with the telephoto lens than with the wide-angle lens.

3. You can jump, span, and leap bridges, rivers, and lakes without showing the foreground.

4. It flattens the apparent subject front-to-back perspective distances. It is ideal for better distortionless perspective with portraits because the nose of a person appears in proper proportion. when you see it at 6′ instead of having it jut out in distorted dimensions as it would at 3½′ to 3′.

5. It increases the amount of working room between the lens and the object. This is a valuable characteristic for subjects that cannot have floodlamps too near them because of lamp heat, etc.—a situation generally

encountered with medical subjects because of the danger of burning body tissue.

6. The increased lens-to-subject distance decreases the self-consciousness of the subject.

7. It permits flash pictures that do not require handkerchiefs to reduce the intensity of light. The increased flash-to-subject distance, if the lamp is on the camera, reduces the intensity of the light sufficiently.

TELEPHOTO SHARP PICTURES. The critical sharpness, the depth-of-field sharpness, and the hyperfocal-distance sharpness for telephoto lenses are very shallow, as you can see when you bring the infinity mark to *f*/4. The 85mm lens, for example, will have everything sharp only from 70′ to infinity at *f*/4. The 135mm lens produces a sharp image from approximately 110′ to infinity at *f*/4. This is in great contrast to the effect possible with our wide-angle lens wherein everything is sharp from 15′ to infinity at *f*/4. Greater care, therefore, is needed to focus telephoto lenses because the area of sharpness is limited by theoretical optics, regardless of your own technical efficiency in focusing. Critical focus, with the lens wide open, is checked through the ground-glass. Depth of field is checked by observing the regular distance scale and then rotating the distance point relative to the depth-of-field scale so that the area of sharpness can be determined with the *f*/ markings around the side of this point index.

TELEPHOTO SHUTTER SPEEDS. A telephoto lens magnifies both the image and any camera vibration that may occur while shooting the picture. Avoid this, either with the fastest possible shutter speed (over 1/100 sec.) when the camera is hand-held or by using a steady tripod.

THE WELL-EXPOSED TELEPHOTO PICTURE. Outdoor exposures with telephoto lenses must be carefully read because very often the subject may be lighted in a way entirely different from that of the spot from which you are shooting. A mountainside, for example, may require a different exposure setting for a telephoto lens than for a wide-angle lens. This may be so if your main telephoto subject is in the significant shadow side of a tree, cave, or ledge. Therefore, take a substitute reading, with the same light falling on the test object as on the telephoto subject. If this is impossible, take a general reading and allow wider lens openings of one, two, or three stops, depending on whether the subject is in shade, shadow, or deep shadow.

Use a behind-the-lens reading exposure meter or a cadmium sulfide exposure meter having a narrow angle of view. A selenium cell, unless the subject is in frontally lighted daylight, loses accuracy if it is 4X the subject area. Therefore, check whether or not your meter is reading the significant subject. If it is, compensate for the exposure meter's "middle-gray brain" according to the black-and-white tone or color of your subject. If it is not, seek a substitute subject that appears lighted similarly, use your experience, or use the APEX additive exposure charts in the author's "Handbook of 35mm Practice," another of Chilton's Modern Camera Guides. This book contains the data of several hundred subjects which cannot be read accurately because of space conditions.

BASIC AVAILABLE-LIGHT SHOT II

Why Shoot Available-Light Pictures?

Available-light photography is spontaneous, realistic, and exciting because of its "slice of life" quality. The avoidance of the time lost in replacing flashlamps or waiting for speedlights to recycle, and the absence of the heat from floodlights as well as the unavoidable electrical cords required for them—all contribute to placing your subjects at ease. The more natural settings make it easier for your subject to forget the camera. There is no flash or heat from lamps to remind him that his photograph is being taken.

Types of Available-Light Pictures

Available-light pictures are taken by light already existing in home areas, meeting places, or theater stages, without having the prevailing light boosted with additional extra light brought in solely for photographic purposes. If flashlamps or floodlights are used to take the picture of these areas, then it is no longer (technically) an available-light picture. Therefore, for available-light pictures, it is best to load your camera with fast film like Kodak Tri-X, EI 400 or Agfa Isopan Record, EI 1300.

There are two basic types of available-light pictures: type IIa, normally exposed, and type IIb, "pushed."

In Shot IIa, the fastest possible film is used. Hence a normal exposure tends to maintain the best tonal values for which the film was designed. If film speed still is inadequate, because a too-slow shutter speed is indicated, then the entire roll of film can be given a "pushed" rating. But the entire roll must be shot at a consistent rating. This means that it is exposed at higher exposure index than normal and the film is specially developed to produce a usable image. While both black-and-white and color film can be "pushed," the contrast range of black-and-white film is increased so that truly great exposure-reading and developing skills are required in getting a usable print for black and white. In color film, the color gradation is lost when rating is pushed, so that colors no longer are true, but in either case you *do* come back with pictures!

Before shooting pictures at "pushed" speed, think in terms of desirable, acceptable, and usable qualities. What you see with your eyes is desirable. What your camera reproduces should be acceptable. When the shot cannot be retaken, then, of course, it must be usable. Consult Part II, Fundamentals, for theory.

Praktica, Etc., Available-Light Shooting Review

All cameras in our families can take available-light pictures under normal conditions if the lenses are at least *f*/4, or under "pushed" conditions if they are *f*/8. The film should be "pushed" only as an emergency measure, because supreme-speed films like Agfa Isopan Record which has a new exposure index of 1300/8.5°) permits "normal" exposures under average home-lighting conditions of 6 footcandles to be taken at approximately *f*/4 at 1/15 sec. (*f*/2.8 at 1/30). This is possible with a tripod or a technically efficient hand-held exposure.

Lenses of 35mm, 55mm, 85mm, 105mm, 135mm, and even the 300mm *f*/4 can be used for normal available-light pictures. Although a regular exposure meter is valuable for areas that can be measured, it is of little value for areas that it cannot reach, such as ringside from a balcony. Then experience must be called upon. The Basic Available-Light Shot II exposure table is based on experience, and by using it with judgment, you will bring back pictures.

On the occasions when the exposure is merely a "guesstimate," then the film must be developed by inspection, for safety. If you need only a few shots on a 36-exposure roll, shoot an extra roll of test shots under the same lighting conditions, change your film, and then shoot the important subjects. The test roll should be developed by inspection, to understand properly the developer and developing times for the important shots. For convenience, the available-light exposure charts are placed in the Factopedia.

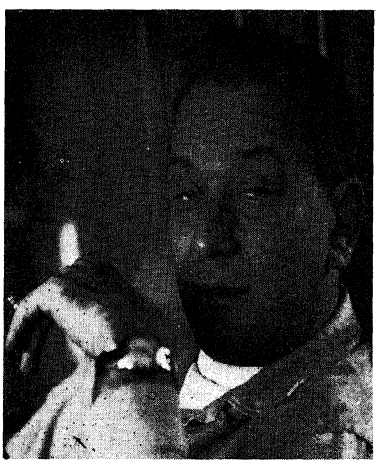
BE SAFE—DEVELOP BY INSPECTION: *Preparation.* Professional photographers cannot afford to take the chance of either underdeveloping or overdeveloping their negatives. They develop their films by inspection, observing the film as it develops, under carefully planned conditions of lighting the darkroom with a No. 3 Wratten dark green filter over the safelight.

Applications of Development by Inspection. Available-light pictures should be developed by inspection because these are usually "only-once affairs" and cannot be retaken. With a soft, average, and vigorous developer ready, you should get a usable picture.

Landscapes and high contrast shots are likewise improved because you can either add or limit the control range of your negative.

Film rolls having a "mixed bag" should be developed and inspected with scissors handy so that an important frame may be given the individual treatment it requires.

Available-light shooting must be used in dimly lighted museums.



Available light portraits can be as expressive as formal shots.

BASIC DIRECT-FLASH SHOT III

For the theory describing Basic Direct-Flash Shot III, consult the Factopedia. Our plan of preparing, practicing, and applying our experience can be followed in this technique, too. The illustrations show your camera settings for Basic Direct-Flash Shot IIIa for flashlamp and IIIb for speedlights. A preset technique is the simplest. Copy the chart in the Factopedia and paste it onto the reflector, or carry this Guide with you.

After you have prepared for direct-flash shooting, practice shooting the subjects and situations outlined in your practice program. From practice you will produce answers which can then be applied to the real shooting assignments where you must bring back pictures.

Preparing the Praktica, Etc., Direct-Flash System

All new cameras are synchronized for all flash forms for flashlamp (FP) socket or (X) for speedlights. They have a standard PC female contact.

The synchronizing sockets to be used for flashlamps or speedlights and the matching synchronizing speeds are listed in the synchronizing chart or the camera specifications for your convenience. As an example (Chap. I):

Camera: Edixa-Mat Flex

Flash	*Socket*	*Synchronizing Speed*
Speedlight	X	1/25 or 1/50

Most flashlamp holders accept No. M5 flashlamps, as well as other lamps having similar bayonet contacts, or smaller sizes to an AG-1 with an adapter. However, it is wiser to practice with one lamp and learn to use it well than it will be to learn the names and nature of too many lamps.

Practicing a Single-Lamp, Basic Direct-Flash Exposure

You will take the *best* flash pictures if you follow this simple procedure:

1. Pre-set flash synchronization, shutter speed, distance, and *f*/opening; or

2. Find subject distance (any distance). Divide distance measurement by the flash guide number (GN). The answer becomes your "working" *f*/opening.

DIRECT FLASH, ONE PERSON OR SUBJECT. One person or subject, or a few arranged side by side, is shot by simply pre-selecting the body size, setting the focus for sharpness, setting the aperture for the exposure, and then moving back and forth until the subject is sharp when observed in the ground-glass. Release the shutter when the subject is in a creatively

different pose. The picture should be sharp, well exposed, and interesting.

Prepare the camera according to the shooting plan. *Practice.* Apply the one-person shot for press situations where one person is all-important.

Direct Flash, Group Subject, Single Flash

The problem in applying a single flash to expose a subject that has depth (such as people seated at a long table) differs from that of exposing a subject having a single plane. One lamp can be made to illuminate a long area, such as a table in your home, so that it, too, will be sharp and well exposed throughout. Select a table in your home and place a statuette on it at the half-point.

Preparation. An M5 lamp or a speedlight with the power of an M5 is preferred because sufficient power is necessary to use an *f*/11 or *f*/16 opening.

Practice!

A SHARP IMAGE. Focus at the halfway depth of your subject. If a table is 12′ long and its nearest edge is 6′ from the camera, then the halfway subject depth is 9′ because one-half of the subject's length is 6′ and the near distance is 6′; thus, 6 plus 3 equals 9. This can be computed without mathematics by selecting an object that is at the halfway point of the table, focusing for it, and reading the distance from the scale.

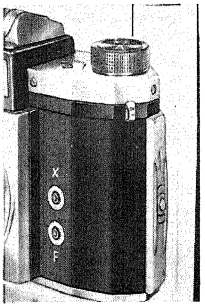
A WELL-EXPOSED PICTURE. Now set the aperture in this way:

1. Calculate the *f*/ opening for this halfway subject distance of 9′. If you know the distance from the previous calculation, divide it into the guide number, or look at the distance scale after your subject is focused, and use this distance as the number to divide into the guide number.
2. Hold the flash high, away from the camera, and aim it at this halfway distance to avoid overexposing the foreground figures.

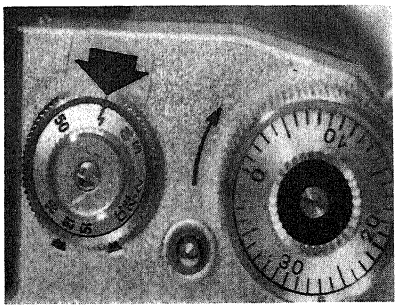
Note. Direct flash can be used off the camera with an extension cord. With an extension, the lamp-to-subject distance determines the exposure regardless of the camera-to-subject distance.

WRITE THE DATA ON YOUR CHART. In an average 15x15′ room, if the nearest subject is at 6′ and the farthest at 12′, then the halfway mark will be at 9′ (6 plus 3).

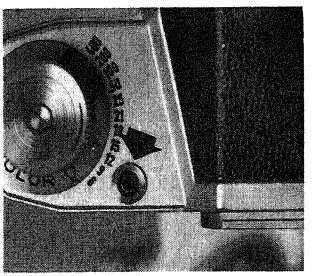
Application. Most parties, festive occasions, etc. occur under standard conditions. In a home, the accompanying chart applies. In a room twice the size, with a larger table, then the *f*/opening twice wider should be used. Follow the preparation, practicing, and application program and you will always have a photographic answer for new situations because they will usually be no more than variations of what you already know.



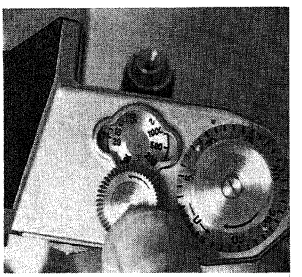
The Praktica, the Praktina, and the Edixa reflex cameras have a two-socket synchronization similar to this.



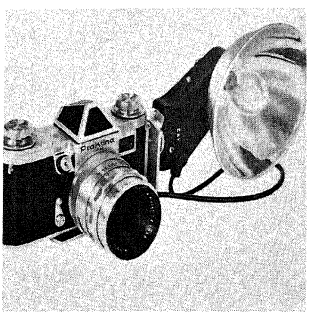
The Praktica coaxial dial must be set at the speedlight mark when the synchronization socket is used.



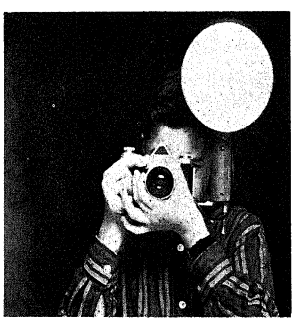
The Pentacon has a single Continental PC socket.



The Pentacon speedlight synchronization is at 1/20.



The direct-flash setup.



The speedlight setup. Check speedlight synchronization factors because focal plane synchronization is the rule, with the exception of the Edixa motor camera.

BASIC BOUNCE-FLASH SHOT IV

Preparing the Exposure

Flash synchronization for bounce flash is the same as for direct flash. The lamp, however, must be pointed to a ceiling or wall for the bounce effect. If an M5 flashlamp is used, then use it at FP synchronization, and at the correct speed for that guide number. Speedlights, of course, must be used at X synchronization, and at the X shutter-speed marking, which usually is the fastest speed for X synchronization.

FIXING THE FLASH LAMP OR SPEEDLIGHT IN THE BOUNCE POSITION. Ask your camera dealer or camera repairman for a male and female extension cord so that the flash can be placed on a flash-holding bracket in the bounce position. Use a bracket with a tilting head for rapid adjustment from the direct to the bounce position. The speedlight can be hand-held on the bounce position or on a slide bracket mounted on the under side of the camera mounting socket for holding the speedlight. It is advisable to learn the bounce because of the manifold advantages of bounce flash.

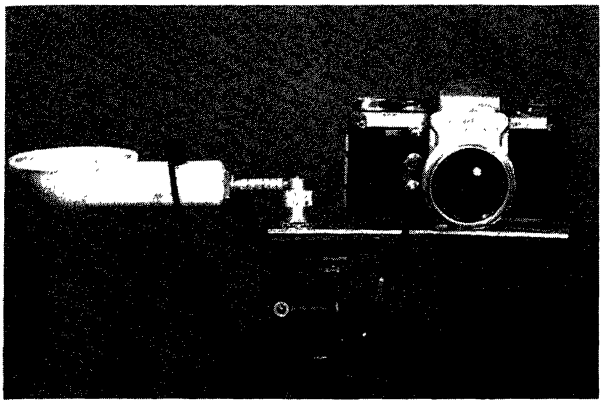
A SHARP PICTURE. Since the light-to-subject bounce distance is not so critical as with direct flash, focus can be set at an average distance of 8′ or 10′ for most indoor home subjects. Check with the Bounce Flash Chart in the Factopedia. Critical sharpness for closeups should be made if you are very close to your subject. Otherwise, you can use your depth-of-field chart, which tells you that a setting of 10′ at *f*/8 produces a range of sharpness from approximately 7′ to 20′.

A GOOD EXPOSURE. Practice a series of test shots in your home at all openings after focus has been set at 8′ or 10′. In this way you will learn how to recognize an *f*/8 ceiling, an *f*/5.6 wall, etc.

Start with the Basic Bounce-Flash Shot IV charts in the Factopedia. These chart data are derived from actual working results obtained by professionals and from extensive testing by manufacturers. Make the most of them.

Bounce-Flash Shot Applications

Natural-looking birthday parties, portraits-at-home, commercial illustrations, etc. are the most frequent bounce-flash subjects because the lighting is not so harsh as direct flash.



The setup for ceiling bounce flash.

There are brighter, more natural shadows with bounce light.

BASIC FLOODLIGHT SHOT V

For theory of floodlight practice, consult Parts II and III. The advanced and professional photographer is interested in committing successful set-ups to paper for future reference. In "Portrait Photography" by the author (another of the Modern Camera Guides Series), the following system is described:

Using the Portrait Pose and Lighting Blueprint

The various lines convey these facts:

1. The purpose of the portrait.
2. The letters for identifying the lights if a diagram is given.
3. The function of the light.
4. The numerical intensity of the lamps, so that you may balance your lighting with any lamps other than the four BFA-375's suggested as the starting point for lighting your portrait.
5. The name of the lamp. Here a BFA-375 is used for teaching purposes. You can write the name of your own lamps for reference purposes.
6. Diffusion of the light source. Usually the intensity is cut by half by the diffusing media.
7. The lamp-to-subject distance.
8. The camera-to-subject-to-lamp angle. If the lamp is directly at the side of the camera, then the lamp-to-subject-to-camera is 0° If it is at an angle, then the angle is written down. If it is at a 45°, then you will have first to move your lamp 5′ from the subject and then walk either left or right so that the lamp-to-subject-to-camera angle will be 45°.
9. The subject-to-lamp angle, indicated in degrees. The starting point for a lamp is eye level, or 0°. If it is raised above eye level, then the degree indicated is written down. If it is at 45°, then the lamp is raised sufficiently high for that angle and the lamp is pointed at the eyes of the subject. The 5′ string on the lamp can be used to check the 5′ distance because the lamp raised straight up at 5′ may be farther away than the correct 5′ distance. Should the lamp be lowered beneath the eyes for the creation of a mystery effect, then a minus sign is used. A −45° angle indicates the lamp placement at 45° below eye level.
10. Diagram.
11. Exposure with the BFA-375's.
12. Developer and developing time should be recorded for duplication

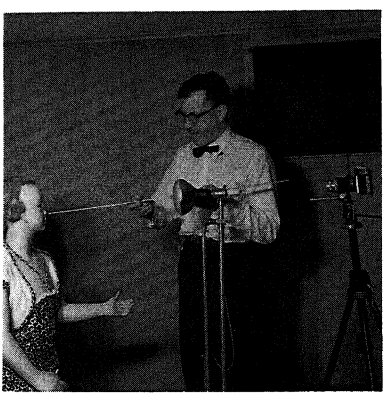
of pictures that please you. The developer and developing time must be known to secure the same quality effects consistently.

Finally, the example of this blueprint gives you the final visualization of how you can expect your own subject to appear.

Portrait Pose and Variation Blueprint

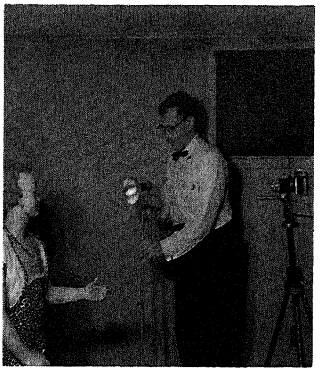
1. ¾ Pose Frontal and Double Back Lighting									
2. *Light*	A	B			C	D	E		
3. *Function*	Main	Fill			Accent	Back	Background, Color		
4. *Intensity*	1	1	½	⅓	1	1	1	2½	5X
5. *Lamp*	BFA-375		BFA-375		BFA-375	BFA-375			
6. *Diffused*									
7. *Distance*	5′		5′		5′	5′			
8. *Camera Angle*	5°		0°		135° R	135° L			
9. *Subject Angle*	20°		0°		45°	45°			

10. Your own example:
11. Exposure: Plus-X, EI 160, 1/60 @ *f*/4
12. Developer:

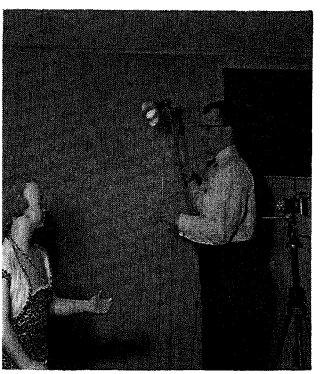


Measure the lamp-to-subject distance.

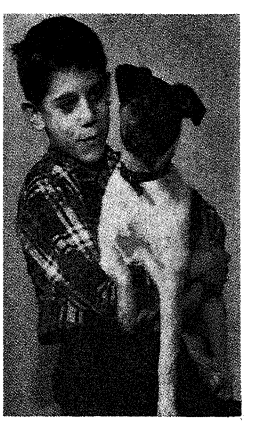
Check the lamp-to-subject-to-camera angle.



Check the lamp-to-subject elevation.



A portrait taken with the blueprint.



BASIC CLOSEUP SHOT VI

The theory involved in closeup shots of subjects is given in Parts II and III, Fundamentals and Factopedia.

Helpful Equipment

Many of your closeups are shot below eyelevel. The right-angle viewfinder (see second section) should be bought because most of your closeups are taken below eye level. The right-angle viewer is especially valuable in shooting low-positioned flowers or insects that are inaccessible at the eye-level position.

ORDERING EQUIPMENT. It is a good idea to list specifications and measurements of your camera so that you will know the correct size of accessories. For example, what is the male and female thread pitch of lens mount, etc. on your camera? The Praktica, Pentacon, and Edixa Flex models have a 42mm diameter fitting.

Your camera dealer will help you match the lens extension tubes or variable bellows attachment to your camera. He also has converting attachments which may permit the lens bank of your camera to be used on any others you may own.

Closeup Portrait Lens Basic Shot VIa

SPECIAL PORTRAIT CLOSEUP LENS EQUIPMENT FOR ALL CAMERAS. Fit your lens with:

1. Closeup portrait lens +1; focuses from 36″ to 19″.
2. Closeup portrait lens +2; focuses from 19″ to 12″.
3. Closeup portrait lens +3; focuses from 13″ to 9″.

Stronger portrait lenses are available from your camera dealer. The Factopedia list includes a +10 which focuses to 4″.

Closeup Portrait Lens Review and Practice

No exposure increase is necessary for this shot, but you must make sure that the image is *sharp* and *well exposed.*

A SHARP IMAGE

1. Use the field finder graph for the specific closeup portrait lens needed for the subject size.
2. Fit the specific closeup portrait lenses for the specific distance required for the specific lens-mount diameter.
3. Set the distance scale, if it has to be reset from infinity.

4. Set the subject at the correct closeup distance and check viewfinder composition.

A Well-Exposed Image

1. Light the subject, read the meter, compensate for tone or color, and set the exposure. Closeup portrait lens do not require additional exposure.

Closeup Lens Extension Basic Shot VIb (except the Edixa-Motor Model)

Purpose of Extension Tubes and Variable Bellows Extension Unit

1. Fixed Extension Tubes. These come in 7.5mm, 15mm, and 30mm lengths, depending on the reduction ratio needed. The tubes can be stacked together for a greater effect. These tubes cover areas down to approximately 24x36mm (1x1-1/2"), a 1:1 ratio.

2. *Variable Bellows-Extension Unit.* The variable bellows unit cannot be used for the same extensions as the fixed type because the added length of the bellows itself, the mount for the camera, and the lens mount have their individual physical extensions. However, if a variable bellows-extension device is wanted because of the time needed for screwing together and taking apart extension tubes, use a lens of longer focal length (such as a 105mm lens) in a short mount (without a focusing sleeve) so that the bellows can be focused at infinity and still permit near-focus to a 1:1 natural size. The bellows are sufficiently long to permit subject magnification with the 58mm or 35mm lenses.

Both the fixed extension tubes or bellows extension units, for convenience, may have a focal frame attached to them to show both the correct lens-to-subject distance and the field size of the subject.

Closeup Lens Extension Practice

A Sharp Image

1. *Field Size.* The field size is determined by subject measurement, when possible. This is the better way for the fixed extension-tube method. Otherwise, it is too time consuming to keep trying various lengths of tubes until you chance upon the correct one. With the variable bellows-focusing unit, it is easier to determine the correct compositional subject size because you can jockey back and forth until you are satisfied with the necessary subject size and its composition within the ground-glass.

2. *Camera Makeup.* When the exact subject size is known, use the appropriate extension tubes or set the variable bellows-focusing unit at the correct lens-extension distance (often marked on the extension bed). This fixes the reproduction ratio.

3. *The Distance Scale.* This can be varied if a 7.5mm extension tube is used. However, the distance scale on the camera and/or focusing lens mount usually remains at infinity.

4. *Subject Focusing Position.* The subject is either brought near the lens or the camera is moved toward the subject until the image is sharp.

A Well-Exposed Closeup

1. *Lighting.* Set the lights as you would for a portrait-lens closeup, using either direct flashlamp, direct speedlight, or floodlights. The basic exposure is read in the regular way.

2. *Lens-Extension Compensation.* If the lens-extension compensation factor is known, its correction can be read from the chart in the Factopedia. Use it to widen the *f*/opening, or use a slower shutter speed, or bring the lamps nearer for more light.

If the lens-extension compensation factor is unknown, place the millimeter ruler of the Factopedia in a position vertical to the 1" dimension of the ground-glass and read the number of millimeters that can be seen. Then look up this figure in the millimeter ruler chart in the Factopedia (page 123) to learn the lens-compensation exposure factor. Apply this exposure factor with the lens-extension compensation chart in the Factopedia.

For flash, the lamp-to-subject distance can be calculated with the formula:

$$\text{Lamp distance} = \frac{\text{flash guide Number X12 (for inches)}}{f/\text{ opening x lens extension factor}}$$

If a bellows unit is used with a speedlight with a guide number 25 for Kodachrome, Daylight, at *f*/16 for a 1:1 reproduction ratio having an exposure factor of 4, the lamp is placed at

Following our formula, you see that

$$\text{Lamp distance} = \frac{25 \times 12}{f/16 \times 4} = \frac{300,}{64} \text{ or } 5''$$

Kodachrome, Daylight

Magn.	*Exp. Factor*	*Lamp-to-Subject Distance*	*G.N. 35*	*G.N. 25*
1:1	4X	5"	*f*/22	*f*/16
1/2:1	9X	3"	*f*/16	*f*/11
1/3:1	16X	2 2/5"	*f*/11	*f*/8
1/4:1	25X	2 2/5"	*f*/7	*f*/4.5
1/5:1	36X	2 2/5"	*f*/4.7	*f*/3.5 2 flashes at *f*/4

For Kodachrome II Daylight, narrow opening 1 1/3 stops.

Check Your Settings. Recheck the exposure-increase compensation, recheck sharpness and exposure readings, and shoot a perfect closeup.

Closeup Extension Working With Automatic Diaphragm. The longer the lens extension the dimmer the ground-glass image. The normal inclination is to focus with the iris wide open. If your camera has an automatic diaphragm and there is no interlock between the automatic device and the shutter release, your normal reaction is to release the shutter when you think you are ready. You forget to narrow the iris from force of habit. Your pictures are then overexposed. Even if you ask yourself whether your picture is sharp and well exposed, dependence on the automatic diaphragm can cause you to forget.

The Praktica, Pentacon, and Praktina have a special connecting tube which is used on the bellows or extension tubes with a special double cable release that permits the automatic diaphragm to be tensioned and operated automatically.

Photomicroscopy

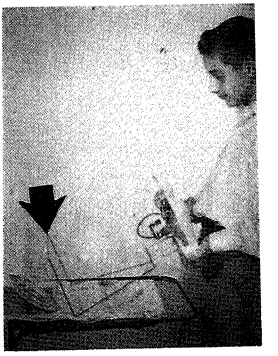
The microscope adapter set is used by removing the camera lens and replacing it with the adapter, which is then attached to the microscope. The microscope's objective-ocular system becomes, in essence, your camera lens.

A sharp image is secured by direct focusing on the ground-glass or by using a technique known as *focusing by parallax.* Photomicroscopy is a specialized field requiring special techniques.

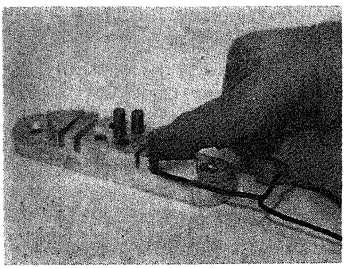
A well-exposed image requires special photomicroscopy exposure-reading methods.. The author's "Handbook of 35mm Practice" describes the technique in detail.

Summary

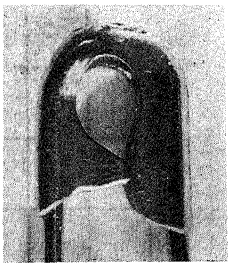
Basic Closeup Shot VI is a valuable addition to your armamentarium. It affords pleasure in making interesting shots of a new world that is ever-changing and creatively different. It is a scientific aid to the medical and industrial fields.



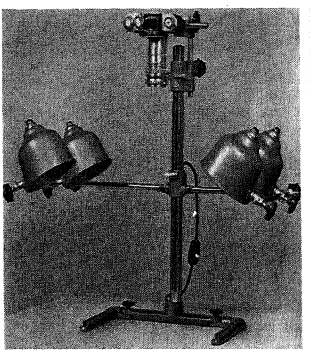
Use the fieldfinder graph or a focal frame for your basic field size and distance information.



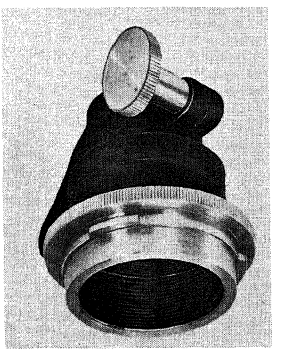
Portrait close-up lens pictures are easy with a routine setup, following a standard step-by-step procedure.



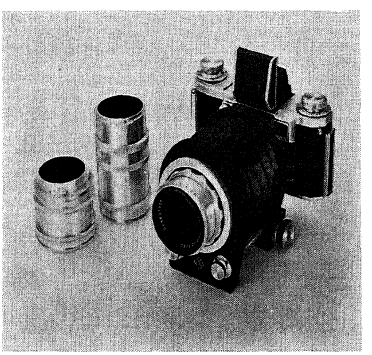
A graph background is a valuable reference for precise measurements.



The Fold-o-Mat copy stand in use with the Edixa reflex.



Microscope adapter.



Bellows and extension tube units for close-ups and photomacrography.

Part II. Fundamentals

THE FILMS TO USE

The backbone of any profession, science, even art, is its storehouse of fundamental facts. The basic information useful for photography is arranged here both for reference and as a basis for further study. The first part of the book illustrated the use of the camera; in this part you will be given a theoretical background for these decisions.

Film Selection

Shooting becomes so much easier if you have the right film for the job. To try to use a slow film for an available-light assignment would increase your difficulties. Therefore, a knowledge of film capabilities is desirable.

SPEEDS OF BLACK-AND-WHITE FILM. A great variety of black-and-white films is manufactured. They can be divided conveniently into these groups:

Group I: Slow Speed. Up to ASA 50/4°. Thin emulsion; fine grain. Recommended when finest grain is required or when extreme enlargements will be made. Typical name: Kodak Panatomic-X.

Group II: Medium Speed. ASA 64/4.5° to 160/5.5°. Moderate grain—excellent for all-around shooting. Typical names: Kodak Plus-X, Kodak Verichrome Pan.

Group III: High Speed. ASA 400/7° to 800/8°. Acceptable grain—the standard choice for available light. Typical names: Kodak Tri-X; Ilford HPS.

Group IV: Super-Speed. ASA 1200/8.5° to 2000/9°. Passable grain—for very dim available-light situations. Typical names: Agfa Isopan Record; Kodak Royal-X Pan.

Group V: Special Purpose. Infrared film, direct positive, microcopying, and emulsions are available for specific purposes such as infrared or microcopying photography.

COLOR-POSITIVE, PROJECTION TRANSPARENCIES. This is probably the most popular film stock because it gives color slides which can be projected for group viewing. Color prints can be ordered in a wallet size from the color-positive transparencies or enlarged up to 16″ by 20″.

COLOR-NEGATIVE FILMS. Kodacolor film is a moderate latitude, color-negative material designed for picture taking under daylight or clear flash illumination. Differences produced in the negatives by these different light sources are usually compensated for in the printing operation. Thus

the photographer can take daylight or flash pictures on the same roll.

Kodacolor 135 film has a moderate grain structure that makes it possible to achieve fine-quality enlargements from a 24mm by 36mm negative. Good enlargements up to 11" by 14" can be obtained from sharp, well-exposed, 35mm Kodacolor negatives.

Color-negative films can be used to take pictures in daylight or with clear wire-filled flashbulbs, without using filters, because differences in color cast can be compensated for in printing. However, if you want to take pictures with photoflood lamps or with electronic flash, you should use filters to balance the light so that it is the same as for clear flash. Then a commercial finisher can give you satisfactory prints. Otherwise, you should send such pictures to a custom photofinisher with careful notations on the type of light used.

For the more advanced: Kodacolor is balanced to 3800° Kelvin (K)—the same as Type F films. If you do your own printing it is best to use an 85C filter for daylight shots and an exposure index of 25 rather than 32.

Color Film Qualities

COLOR TRANSPARENCIES (REVERSAL) FILMS:

Group I: Slow Speed. Properties include fine grain, high contrast, full color saturation. Typical name: Kodachrome (Daylight, Type A, Type F).

Group II: Medium Speed. Properties include medium contrast, soft color saturation. Typical names: Anscochrome (Daylight); Ektachrome (Daylight, Type F).

Group III: High Speed. Properties include medium-coarse grain, low contrast, softer warmish tone. Typical names: High-Speed Ektachrome (Daylight, Type B); Super-Anscochrome (Daylight, Type B).

COLOR NEGATIVE FILMS:

Group I: Slow Speed. Properties include fine grain, sharpness, brilliance, high contrast. Typical name: Agfacolor negative CN 14.

Group II: Medium Speed. Properties include medium grain, softer saturation, medium contrast. Typical names: Agfacolor CN 17; Kodacolor.

The Four Basic Ways Film Is Balanced

There is one important difference between black-and-white and color films: the way they react to light. With black-and-white film you are not concerned so much with what *kind* of light you have as much as whether you have *enough* light to make a picture. In color photography, of course, you need enough light too. But you also need a film matched to the kind of light you are using—or, put the other way, a light source matched to your film. Daylight and artificial light cause quite different reactions on color film. Daylight tends to be bluish in color; artificial

light (at least the kind you associate with electric bulbs) tends to be yellowish.

Photographers express this difference in light quality with the term "color temperature" or degrees Kelvin. The more *blue* a light source contains, the *higher* its color temperature. The more *yellow* it contains, the *lower* its color temperature. Thus daylight tends to high color temperatures, artificial light to lower ones. And each type of color film is balanced for some degree of color temperature to give you best results with a certain kind of light. The basic color emulsions are balanced as follows:

1. For Daylight. Films like Anscochrome and Kodachrome are balanced to light of about 5000° to 6000° K. Perhaps this figure will mean something to you if you understand how the sun's color temperature changes during the day. The sun rises at about 4500° K and increases gradually to about 6500° K during its peak hours, before dropping off again at sunset. That's why you are told to take color pictures only between 10 A.M. and 3 P.M. It is between these hours that the sun's color temperature most closely matches that of daylight-type color film and you will get the most accurate color renditions.

2. For Indoor Artificial Light. These films (Ektachrome Type B and Anscochrome Tungsten, for example) are balanced to 3200° K—considerably less than daylight films because of the amount of yellow in most indoor light sources.

3. For Professional Color Lamps. A film like Professional Kodachrome Type A is balanced to 3450° K for special lamps designed to be used with it in studio setups.

4. For Flash Photography. Type F films are balanced for 3800° K, the color temperature of light from clear, wire-filled flashbulbs.

For best results you should try to use the correct light source for your film, or vice versa. If you use artificial film in daylight, your pictures will appear bluish. If you use daylight film indoors with clear flashbulbs or incandescent lamps, you will get a yellowish cast in your pictures.

Use of Filters

Sometimes it may not be practical to switch from indoor to outdoor film when you want to take some pictures in the living room and others in the yard. At this point filters become a useful tool for balancing light different from that for which your film was balanced. By the same token, if you have outdoor film in your camera and want to use it indoors with floodlamps, you need a filter to balance the color when its K temperature changes.

Note, however, that when using daylight-type film with *blue* flash lamps, no filter is required. In this case, the color of the lamp already is balanced to the film. That's why blue flash lamps are recommended

for indoor pictures with outdoor film. They give you a quality of light close to that of the sun.

Filters are designated by numbers. The accompanying table presents some of the filters commonly used to convert a film from one color balance to another.

Film Name and Type	*Filter to Use for Converting to Type of Light Named*				
	Daylight	Electronic Flash	Clear Flashbulbs	Photo Floodlamps	Studio Color Lamps (3200° K)
Anscochrome (Daylight)	x	81A	*	80A	80A
Ektachrome (Daylight)	x	None	80C	80B	80B+82A
Kodachrome (Daylight)	x	None	80C	80B	80B+82A
Anscochrome (Flash)	85C	*	None	82A	82B
Ektachrome (Flash)	85C	*	None	82A	82C
Kodachrome (Flash)	85C	*	None	82A	82C
Kodacolor (Universal)	None	85	None	82A†	82C†
Kodachrome Professional (Type A)	85	*	81C	None	82A

* Not recommended.

† For best results though not essential.

Summary

Black-and-white film, rather than color, is preferable for the beginner. It has greater exposure latitude than color. That means that you can afford to make exposure errors of one or two stops and still get printable negatives. Because there is no color balance to worry about, you can concentrate on picture qualities and "seeing" rather than purely technical matters when using black-and-white film.

Because black-and-white is cheaper, you can afford to make more mistakes with it. Thus it's a good film to learn with. After mastering basic techniques—exposure, focusing, composition—you can shift to color with some assurance that your pictures will be good ones.

A SHARP PICTURE

Prime Essentials for Good Pictures

Sharpness and correct exposure are basic to good pictures.

In standardizing camera operation ask yourself: Am I **SET**? **S**-Sharp; **E**-Exposed correctly; and **T**-Thought out for treatment which is interesting. If you are **S-E-T**, then **SNAP** the picture. It is easy to tell whether your pictures will be sharp because the ground-glass, the rangefinder of the 35mm cameras, and the universal focus settings of some others couple subject sharpness with the sharpness on the film plane so that what you see will be pretty much what will appear on the film.

FAST SHUTTER SPEED—SHARPER PICTURES. A fast shutter speed minimizes camera motion and so ensures a sharper picture. A speed of 1/100 should be the minimum for hand-held pictures at the start. Later you should be able to hand hold 1/25. *Important Note:* Cameras with shutter speeds of 1/125 will use this speed instead of 1/100, 1/60 instead of 1/50, 1/30 instead of 1/25, etc. For correct motion-stopping speeds, see Shutter Speeds for "Stopping" Moving Subjects, in the Factopedia.

Sharper Pictures Mean Better Pictures

Focusing correctly means getting your main subject in sharp focus, be it a house, a tree, a child, or a group of people. There are three basic ways to do this, depending on what your subject is: (1) focusing on the main subject; (2) using the depth-of-field scale to obtain sharpness over a large area; (3) zone focusing to include moving subjects.

1. SIMPLE FOCUSING. This means focusing on your main subject to assure its sharpness without regard to what's in front of or behind it. *How* you do this depends on your camera. With a ground-glass, you watch the glass, turn the focusing knob, and set it at the point where your main subject appears to be sharp. With a split-image rangefinder, you turn the focusing knob until the two images coincide upon your main subject. With a simple camera that has no visual focusing device, estimate the distance from camera to main subject, then set the camera.

2. USING THE DEPTH-OF-FIELD SCALE. If your camera has such a scale, it will enable you to find out in advance *how much* of a given picture will be focused sharply when the camera is set for a certain distance and a certain aperture. Please note that the depth of field (also called "range of sharpness") *varies* with the opening or closing of the lens aperture. In general, the smaller your lens aperture, the greater your range of sharpness. Thus a lens focused at 10′ will have

a greater range of sharpness at *f*/16 than it will at *f*/8.

However, depth of field *also* varies with the distance upon which a lens is focused. At *any* aperture setting, whether *f*/2 (wide) or *f*/16 (small), a lens will give greater depth focused upon distant objects than it will when focused on near ones. So, as a rule, there are two ways to increase your depth of field, if you must: (1) stop down your camera to a smaller aperture; (2) move back from your subject.

What is depth of field good for? In ordinary snapshooting, let's say out-of-doors in good light at 10′ or 15′, the average camera will give adequate depth of field for most pictures. But suppose you want to shoot the family sitting around a picnic table, so that every face is in sharp focus. Perhaps the table is 10′ or 12′ long. You can guarantee every person in that range will be in sharp focus by moving back; but the farther you move the smaller grow the faces.

You must select the smallest aperture consistent with the amount of light on the scene. First stop the camera down to, say, *f*/16 or *f*/22, then balance the exposure by setting the shutter speed accordingly. Next, determine at what distance the camera must be focused—and *from* what distance—to give a sharp image from the nearest face to the farthest. Do this by using the depth-of-field scale on the camera. Generally, this consists of two sets of aperture numbers matching those on your camera. The numbers, often engraved around a dial, run from lowest (say, *f*/2) at the mid-point to highest (say, *f*/22) at the left and right ends. Most often this scale runs on a track, the other side of which is the focusing scale, which has a series of numbers for distance-in-feet. Usually, the mid-point on the depth-of-field scale (marked most often with a dot) is also the indicator point for sharp focus. That is, when you move the focusing scale so that number "10" is opposite this dot, the camera is focused at 10′. Any object 10′ away will be in sharp focus *—no matter what the aperture.*

Notice, however, that when the "10" is opposite the midpoint dot, all the other distance numbers distribute themselves to the left and right opposite *aperture* numbers on the depth-of-field scale. It is now possible for you to read your *range of sharpness* (how much depth you have at a given aperture) on the scale.

Say that your camera is set for *f*/16 and focused at 10′. There are *two* *f*/16's on your depth-of-field scale: one at the left end and one at the right. Each falls opposite a number at each end of the focusing scale. On one popular 35mm camera set as suggested, the left-hand *f*/16 shows 30′ and the right hand one just over 6′. On this camera, then, an *f*/16 aperture and 10′ focus yields a depth of field from about 6′ to 30′. Everything falling within that range will be reasonably sharp.

To return to the picnic photo. Clearly it would be possible to take this picture with a depth of field from 6′ to 30′. All that you really need is a depth from 6′ to 18′, since the table is no more than 12′ long. In fact, it would be possible to make the picnic photo with the camera

mentioned above focused not at 10′, but at 9′. For, consulting the depth-of-field scale, you learn that, focused at 9′, this camera gives a range of sharpness from 6′ to almost 20′—more than enough to guarantee that all the faces will be sharp.

What's more, in this example, the distance you must stand from your subjects also is decided for you by the depth-of-field scale. You may not stand nearer than 6′ to the nearest person at the table. Your focus is set, not on anyone in particular, but rather at 9′, the spot calculated (at *f*/16) to give you the range of sharpness required.

3. Zone Focusing. This idea is related to depth of field but is used for different reasons. Say that you are photographing children at play, or a running dog, or a group of dancers. Everything moves so fast you can't possibly change your focus to the principal subject—you'd have no time to click the shutter. Now you don't really need much depth of field, because your subject may only be one child or one couple—a relatively short range of sharpness by itself. But, because the subject is moving rapidly, its position is constantly changing *within* a certain range of sharpness. To guarantee that, when you photograph it, it will be sharp, use zone focusing. Set your camera in advance for, say, 10′ or 12′. Set your aperture and shutter speed depending on the light. Then consult the depth-of-field scale to find the range of sharpness at this particular aperture with the camera focused at 10′ or 12′. Suppose the range is from 8′ to 20′: you know that, whether the subject is 8′ or 20′ away, it will still be in reasonably sharp focus with the camera focused at 12′. Then simply use your judgment. As long as the subject is within what you estimate to be reasonable range, fire away. If the subject moves too close or too far away, you either move or hold your fire. But *don't* change your focus! You *know* in advance the permissible zone you are working with.

Hyperfocal Distance—Sharpness in Unrestricted Depth. Focusing for outdoor sharpness sometimes differs from indoor problems since a landscape, etc., introduces subjects at infinite distance which must appear sharp even though a foreground figure is also expected to be sharp. The hyperfocal distance setting provides this near-to-far sharpness effect. Hyperfocal distance is that point of focus which gives *maximum* range of sharpness for whatever lens opening you are using. Each aperture has only *one* hyperfocal distance, the point of focus for maximum near-to-far sharpness. To find the hyperfocal distance for your camera, set the focusing scale to infinity, then read the number opposite the aperture you are using. It tells the hyperfocal distance for that aperture. Set the camera to focus on that hyperfocal distance and everything will be sharp from half that distance to infinity.

Example: When a "2" lens is focused at infinity at *f*/4, everything from 84′ to infinity will automatically be sharp; but if we set our distance scale at 84′, then everything from 42′ to infinity will be sharp.

A WELL-EXPOSED PICTURE

A well-exposed picture is one of our two ideals. What is exposure? To simplify the problem of exposure and give you an inkling as to what happens when an exposure is made, exposure depends on: (1) film of a definite speed reaction rating; (2) a quantity of light; (3) admission of the light through a lens opening of predetermined size; and (4) the time that the lens opening is free to admit the light to the film—a definite time controlled through a shutter (a timing control device).

1. The *film is selected* from our film bank. Slow film is used when there is plenty of light; fast film, for dim light. As the film manufacturers provide us with a range of film speeds, use them for the purposes for which they were intended—to get the best possible photographic quality. Results are better in this way than if you try to use a slow film for dim light and then force or "push" it by underexposing it and then using special developers to produce a usable image on the film. The film speed is rated numerically so that a film having an EI (exposure index) of 50 is slower by half than one with a rating of 100, etc. The film speed is the basis for making the exposure reading because it determines the ultimate exposure control settings. Check your film speed (see the instruction leaflet that comes with your film) and find exposure with an exposure dial or else with an exposure meter that reads in either conventional *f*/opening/shutter speeds or EV (exposure value) numbers.

2. *Light has volume.* The amount of light striking your film determines the degree of exposure. Direct sunlight is more intense than a light from a household bulb, for example; thus the bulb would have to shine for a longer time than the sun to produce the same amount of light. Spotlights and floodlamps have their intensities expressed in *wattage;* speedlights and flashbulbs have theirs expressed by a *guide number.* To make an exposure, a measured amount of light must be admitted to the camera. How much depends on the sensitivity of the film you are using.

3. The *lens opening* must have a definite size. A wide lens opening admits more light than a small lens opening. Lens openings are calibrated numerically so that you know exactly how much light is being admitted through the lens. A numerical calibration *must be made* so that the exposures can be calculated in advance. The calibration is made by dividing the distance the light rays must travel to reach the film by the width of the lens opening. In this way, if the light must travel 2″

to reach the film and form an infinity image (the focal length of the lens) and the width of the lens opening is 1", then the product of this ratio (called for easy recognition an *f*/number) would be 2"/1" or *f*/2. If the light ray had to travel 8" (200mm) to reach the film, the effective *f*/number for this system would be 8/1 or *f*/8.

The *f*/number, then, indicates the light-gathering capabilities of our lens. An *f*/2 length lens gathers more light than an *f*/8 lens because the diameter of an *f*/2 lens is 2/1 or 1", whereas that of an *f*/8 lens is 2/¼ or ¼".

When your lens calibration is set at *f*/2, *f*/4, etc., you now have a way of knowing what quantity of light is being admitted to the lens.

Lenses are calibrated in full stop openings, which means that there are differences of 100% in light between markings.

Here is a list of lens stops. Each one admits just half as much light as the one before it.

f/1.4, *f*/2, *f*/2.8, *f*/4, *f*/5.6, *f*/8, *f*/11, *f*/16, *f*/22, *f*/32, *f*/44

However, this calibration is *not* fine enough for color film, and many lenses have half-stop indications with click stops that tell you when you are at the halfway point.

4. The *time element,* the amount of time that the shutter remains open is the final factor in our exposure setting, because it is obvious that light cannot be allowed to shine on your film indefinitely. The shutter speeds are marked at varying speed intervals of B, 1, 2, 4, 8, 15, 30, 60, etc., or at B, 1, 2, 5, 10, 25, 50, etc. These numbers mean fractions of a second: 30 means 1/30 sec., for example. When exposure times longer than 1 sec. are needed, the B (bulb) setting is used. Pressing the shutter release at this setting opens the shutter, and it remains open as long as pressure is maintained on the release. A B exposure is usually made at slow speeds up to 5 sec.

T (time) exposures can be made with some shutters which have a T setting but the shutter release must be pressed twice: once to open the shutter, after which it will stay open by itself and will close only when you press the release again. It is wise to use a cable release for these settings. If your shutter setting does not have T, then ask your dealer for a special cable release with a set screw, so that you can lock the depressed plunger and use the B setting for a time-setting effect.

Controlling Exposure

Both shutter speed and lens opening determine the amount of light entering your camera. Thus, every exposure is a balance between the two. What this balance will be depends on the sensitivity of your film to light. However, note that the *amount* or *volume* of light reaching the film can be changed by:

1. Opening or closing the lens aperture.
2. Increasing or decreasing the shutter speed.

As long as your light source and film stay the same, you must always

change shutter speed and aperture at the same time. If you **double** your shutter speed to stop fast action, for example, you must open your lens wider (to the next lowest number) to compensate.

By the same token, if you **reduce** your lens opening (to increase depth of field, for example), you must also reduce your shutter speed by the same amount so that the amount of light striking your film remains constant.

To cite just one example: The sun is shining and you are using Plus-X film (ASA 160) out-of-doors, shooting at 1/125 and *f*/16. Suppose you decide to jump to 1/500 sec. in order to "stop" the movement of a running horse. Since 1/500 sec. shutter speed cuts the amount of light entering your camera to ¼ of what is was at 1/125 sec., you must change your aperture accordingly. In this case, opening one more stop—to *f*/11—will give you *twice* as much light; and opening *two* stops—to *f*/8—will give you four times as much, which is what you need. Therefore your new exposure is 1/500 sec. at *f*/8.

Light Meters

A light meter is an instrument for measuring the intensity of light striking a subject. It not only measures the amount of light; it also tells you which shutter speeds and apertures to use to make an accurate exposure with whatever film you are using.

The only information you have to give the meter is the ASA or sensitivity rating of your film. Most meters have a dial or button which enables you to set them for the ASA of your film. Thereafter every reading you make will give you the correct exposures *for that film only.*

There are two kinds of meters: incident, and reflected light.

THE INCIDENT LIGHT METER. This type "reads" the intensity of light directly from the light's source as it strikes the subject. To take an incident reading, you ordinarily stand by your subject, pointing the meter directly *at* the sun, or at the floodlamp, or at whatever is lighting that subject.

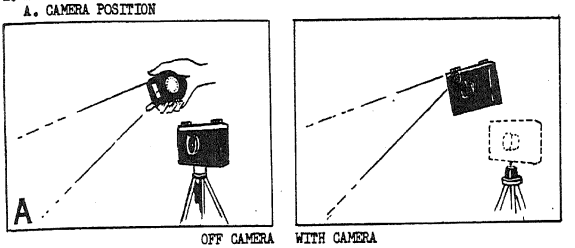
THE REFLECTED LIGHT METER. This type "reads" the intensity of light as it bounces off your subject. To read it properly you must be sure to point it at the subject in such a way that none of the *direct* or incident light strikes it. A good rule of thumb is to make a reflected light reading by holding the meter as far from the subject as the subject is wide. This means perhaps 6″ or 8″ in the case of a portrait of someone's face, but 20′, 30′, or 50′ in the case of a barn. When shooting general outdoor scenery, it is wise to read your light meter as it is aimed at perhaps 45° to the ground. This eliminates much of the reflection from a bright sky, which could cause you to underexpose.

TRIPOD. The production of a sharp picture is always uppermost in our mind. A tripod or some similar immobile supporting device should be used to eliminate the factor of camera motion at slower speeds. A window sill, a car fender, etc., also can be used as a firm support.

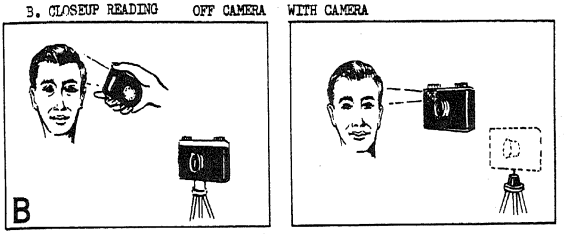
The Basic Exposure Reading Methods

I. REFLECTION READING--BRIGHT LIGHT CONDITION

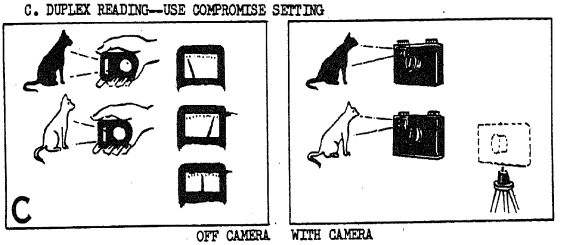
A. CAMERA POSITION



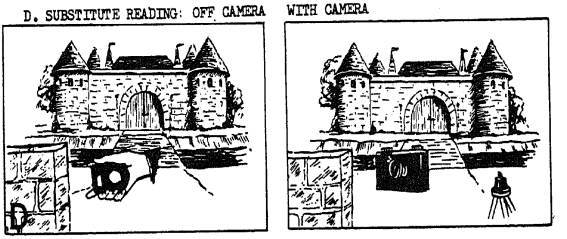
B. CLOSEUP READING OFF CAMERA WITH CAMERA



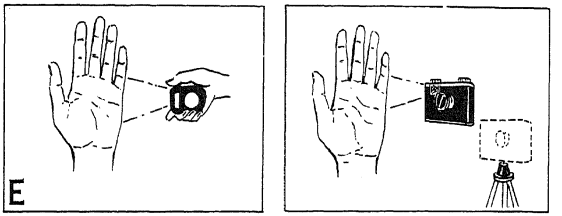
C. DUPLEX READING--USE COMPROMISE SETTING



D. SUBSTITUTE READING: OFF CAMERA WITH CAMERA

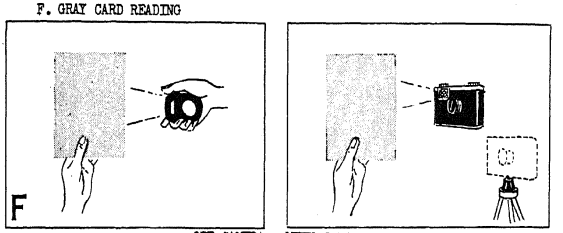


E. HAND 2X METHOD



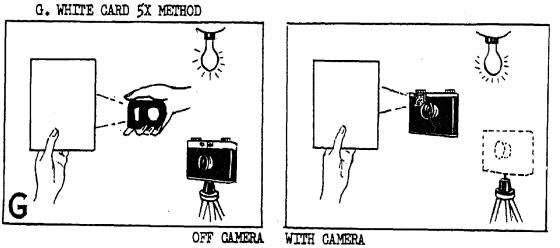
OFF CAMERA WITH CAMERA

F. GRAY CARD READING



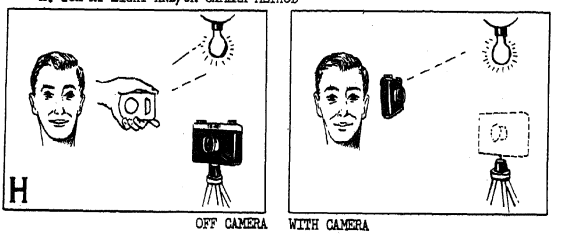
OFF CAMERA WITH CAMERA

Ia. REFLECTION READING--DIM LIGHT CONDITION
G. WHITE CARD 5X METHOD



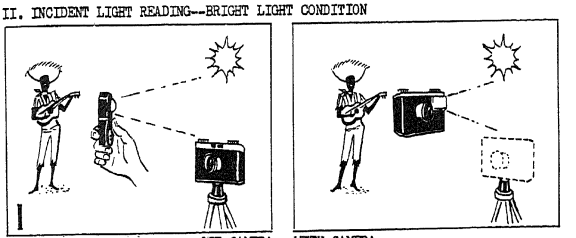
OFF CAMERA WITH CAMERA

H. 20X AT LIGHT AND/OR CAMERA METHOD



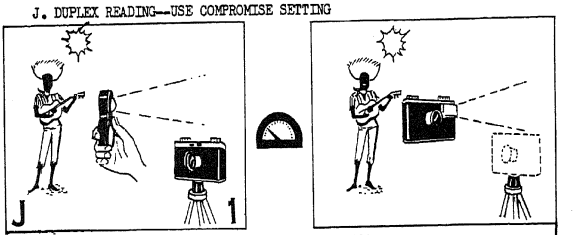
OFF CAMERA WITH CAMERA

II. INCIDENT LIGHT READING--BRIGHT LIGHT CONDITION

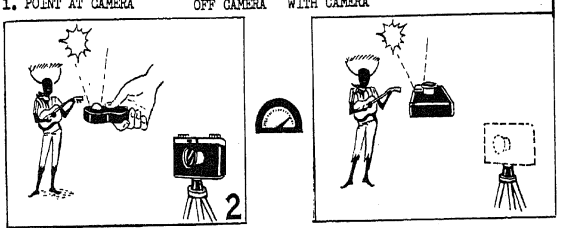


I. SINGLE READING OFF CAMERA WITH CAMERA

J. DUPLEX READING--USE COMPROMISE SETTING

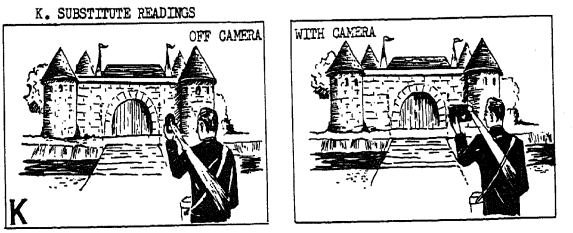


1. POINT AT CAMERA OFF CAMERA WITH CAMERA

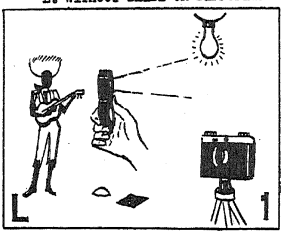


2. POINT AT MAIN LIGHT SOURCE

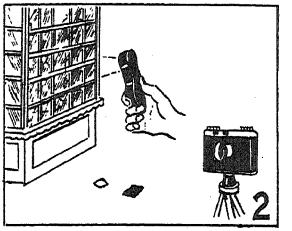
K. SUBSTITUTE READINGS



IIa. INCIDENT LIGHT READING—DIM LIGHT CONDITION
L. WITHOUT SLIDE OR DIFFUSING PLATE

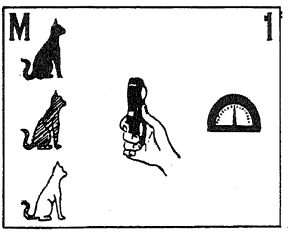


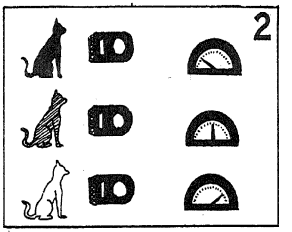
1. 20X AT THE LIGHT SOURCE.



2. 10X SUBJECT REFLECTION.

III. INCIFLECT METHOD—COMPROMISE BETWEEN LIGHT FALLING ON & REFLECTED FROM THE SUBJECT





1. READ THE INCIDENT LIGHT.
2. READ SUBJECT'S REFLECTION & SET A COMPROMISE READING. ONLY THE MEDIUM GRAY SUBJECT REMAINS THE SAME.

Exposure Meter Reading Methods

Meter Originally Designed for Reflected-Light Readings	*Meter Primarily Designed for Incident-Light Readings*	*Transillumination*
Point toward the subject. *Bright Light—Reflection* (a) Camera-position reflection (b) Closeup reflection (c) Duplex reflection (d) Substitution reflection (e) Hand 2X reflection (f) Gray-card reflection	Point toward the camera. *Bright Light—Incident* (a) Single incident reading (b) Duplex incident reading (c) Substitute incident reading	With Reflected-Light Meter 1. Read the opal or ground glass 6" (0.15m) away without any subject on it. 2 Give 5X meter reading light to average transparencies; 10X for darker transparencies.
Dim Light—Reflection (a) White card 5X reflection (b) 20X toward the camera.	*Incident Meter Without Diffusion Device* *Dim Light—Incident Design* (a) 20X toward the camera. *Incident Meter Without Diffusion Device* *Dim Light—Incident Design for Reflection* (a) 10X toward the subject.	*Transillumination with Incident-Light Meter* 1. Place meter with diffusion plate or sphere next to opal or ground glass without any subject on it. 2. Give the exact meter reading for light-to-average transparencies; 2X for darker transparencies.

BASIC OUTDOOR DAYLIGHT SHOT I

Shooting the First Picture—Basic Shot Ia

Load the camera carefully. Walk outdoors and select a subject that you can shoot while the sun is behind your back and shining over your shoulder. Use your wife and child or a couple of friends. Place them in front of a simple background like a building or a fence. Make this first shot a full-length one to include some of the background. To do this, stand back about 15′ or so. Try to catch your subjects in a relaxed mood, talking to one another or watching a bird or an airplane. Then, look through your viewfinder or into your ground-glass and focus carefully on your main subject.

A Well-Exposed Picture. Determine your light conditions (bright sun, hazy sun, etc.), then check the instructions sheet that came with your film for aperture setting. Use a 1/100 sec. shutter speed for this first picture: it will minimize camera movement. If you have an exposure meter, set it for the ASA rating of your film and read your exposure as directed earlier.

Get your subjects to relax, then press the shutter. Since you have checked yourself by asking and answering questions about sharpness, exposure, and interest, your picture should be a good one.

The Best Shutter-Releasing Methods. Releasing the shutter properly is a prerequisite step for obtaining sharp pictures. The releasing action must be smooth, to prevent any camera motion. For maximum sharpness, the shutter may be released in any one of these 3 ways:

1. *Body Release.* This is squeezed smoothly to prevent camera motion which may contribute to an unsharp picture. A vibration-free picture will enlarge without showing an unsharp image. A picture taken by a shaken camera may not show a blur at contact size, but it will reveal it as soon as any enlargement is made.

2. *Cable Release.* This should be *at least* 6″ long, or more, to prevent the vibration of the releasing motion from reaching the camera; a short release will transmit the releasing vibration. Cable releases are available that will snap the shutter from as far as 20′ from the camera. These use the principle of a small air pistol to release the shutter.

3. *Delayed Action: Self-Timer.* A self-timer, built-in (the V setting) or fitted to the shutter release prevents camera motion because there is at least a 5- to 10-sec. delay before the shutter is released. The delay is sufficient to stop most camera vibration. This delay can be utilized to

take a self-portrait because you have time to run into your own picture. The self-timer is valuable for tripod-mounted cameras because a lightweight tripod may vibrate even with the cable release, whereas the self-timer allows it time to become still. This time delay makes the self-timer very useful for copying documents, for self-taken flash. Note that flash synchronization with the built-in self-timer is only at "X."

Basic Shot Ib

For this shot, repeat your earlier picture of friends, wife, children, etc., but take it from only 10′ away. Again check your focus carefully before snapping. This time you'll have less background, with more attention on the figures.

Basic Shot Ic

This time make the same picture, but include only about three-quarters of your principal figures. Move in closer, now, concentrating on facial expressions and lining up the figures carefully in your viewfinder. When you are perhaps 7′ away, focus carefully once again and release your shutter.

Basic Shot Id

Now you're ready to try a head-and-shoulders shot of your child or wife or a friend. This shot should be made from about 3′ to 4′ away, but *no closer than the nearest distance at which your camera will focus!* Again focus carefully just before you are ready to shoot.

Parallax Correction

Some cameras, especially twin lens reflexes and rangefinder 35's, may have a "parallax" problem. It arises because there is a difference between what the camera's lens sees and what your eye sees in the viewfinder, which may be slightly higher than the lens. At longer distances the camera compensates for parallax. On closeups, however, your camera may tend to cut off heads unless you leave a little more room than you think you should when lining up the picture in the viewfinder. A rule of thumb is to pretend (on closeups) that your subject is wearing a top hat, and allow for it. Single-lens reflex cameras (where viewing and taking lenses are the same) present no parallax problems. Many other cameras have automatic compensation. If yours is one, forget about parallax.

A WELL-COMPOSED PICTURE

Basic Composition

Good composition is a pleasing arrangement of subject matter within the borders of the film frame. This simple definition should always be kept in mind whenever the subject of composition is discussed. There are many theories for creating a pleasing arrangement; there are many mathematical arrangements which will help achieve a pleasing arrangement; yet these cannot do the composing for you because you alone must decide what pattern the subject represents.

Using the Viewfinder

Composition by itself means nothing without your camera's viewfinder. The viewfinder is the final judge of what your camera sees, how well your picture will be arranged, whether or not certain elements will be large or small. You absolutely cannot expect to take good pictures until you learn to see them in the viewfinder. No matter what your eyes see—the grand sweep of a tree-filled canyon, a dramatic city skyline, a playground full of laughing children—you can't get any of this onto film unless you see it first in your viewfinder.

So always compose pictures by looking into the ground-glass or through the eye-level finder. Only then will you know whether to move back or forward or to one side to include certain elements.

Seeing Patterns

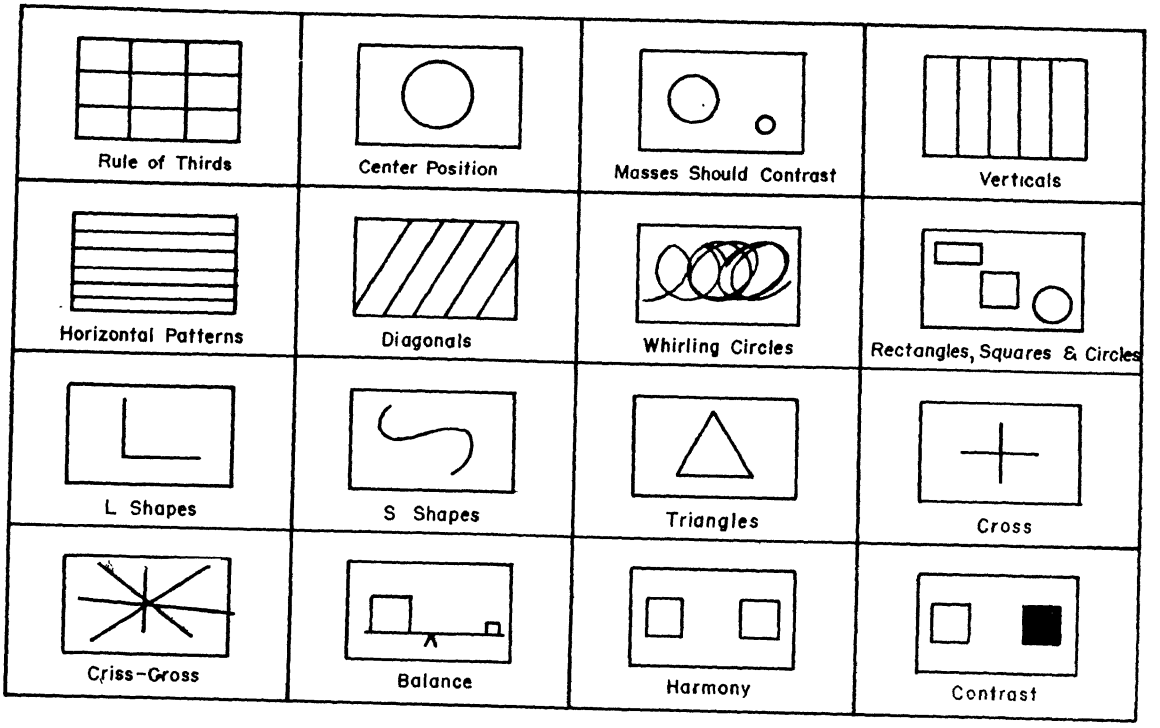
Aside from subject matter, there are certain purely *visual* patterns that trees, rocks, buildings, and people often fall into that help make compositions interesting. If you can learn to see these patterns when you look at subject matter, you can use them to make pleasing compositions. Some of these are listed below. They are not rigid formulas for picture taking, but simply suggestions of some of the elements for which one might look in arranging photographs.

MASSES. A large mass is contrasted with a smaller mass.

VERTICALS. These project dignity, stature, aspirations. Every person, every building, every street sign presents a vertical pattern.

HORIZONTAL PATTERNS. These suggest rest and repose. Landscapes, seascapes, cloudscapes usually are of horizontal format.

DIAGONALS. These create the feeling of motion, dynamic activity.


Rule of Thirds
Center Position
Masses Should Contrast
Verticals
Horizontal Patterns
Diagonals
Whirling Circles
Rectangles, Squares & Circles
L Shapes
S Shapes
Triangles
Cross
Criss-Cross
Balance
Harmony
Contrast

WHIRLING CIRCLES. Like diagonals, these also create the feeling of movement.

RECTANGLES, SQUARES, AND CIRCLES. These forms suggest a feeling of inclusion, containment.

L SHAPES. L shapes induce a feeling of contrast or opposition.

S SHAPES. A sequence movement usually follows an S shape; e.g., a winding path in a road.

TRIANGLES. The solidity of a triangle creates a feeling of domination and/or stability.

CROSS. The cross suggests a meeting of forces, a cohesion, a relationship of parts.

MULTIPLE CRISS-CROSSES. These inspire a mood of expansion, a mood of outward freedom.

Eye-Squint Practice

If you will squint your eyes until they are mere slits, you will find that subject detail in any scene is lost and you can evaluate the weight of one mass against another. Once the S curve, the L shape, or some similar pattern has been selected as the motif within the frame, these "differences" in themselves generally follow a set of rules for the most dramatic effect.

1. DOMINANCE. *One* major area, *one* major emotion, *one* major pattern, *one* center of interest should be most important. You should shoot the picture to project this dominance for instant impact. Dominance can be secured through a difference in subject position, subject size, subject angle, subject height, subject emotion, subject tone, etc.

2. UNITY. The dominant motif must be compatible with the remaining portions of the picture. It must "set well" in the best position within the frame so that it appears as if it belonged there all the time.

3. HARMONY. Besides dominating the picture and fitting well into the proportions, the subject must blend together with the secondary subjects within the picture. While these must be subdued by comparison with the dominant motif, they must be in harmony with the dominant effect and not challenge it with a too aggressive position, tone, mask, etc. Were the challenge too great, then your picture would have two centers of interest and might lose vitality because attention would be diverted from one point to another.

4. SEPARATION OF foreground, mid- and background.

5. CONTRAST CONTROL of these three areas.

Black-and-White Composition

White, black, and intermediate tones to gray are the elements which can create shades and shadows of interest in black-and-white film photography. For this reason, landscapes are usually disappointing because, while our eyes see the scene in color contrasts, black-and-white film

records most colors in shades of gray. The beautiful scene you saw often becomes monotonous when photographed with black-and-white film.

Filters for black-and-white film, however, can be used to play up tonal contrasts. The most common ones are yellow, green and red. Each color creates a different kind of contrast. Here are some ways filters are used:

1. YELLOW. This filter absorbs blue light. Thus it can be used to darken blue skies and make clouds stand out. It also darkens blue water and gives sharply defined black shadows in snow scenes. A yellow filter is of no use unless it is used on a clear day when the sky is blue.

2. GREEN. A light green filter also helps keep sky and clouds in your picture, but it tends to give more pleasing skin tones in outdoor portraits. It also brightens green trees and plants.

3. RED. This filter is often used to make simulated "night" pictures. It turns blue skies to deep black and makes clouds stand out dramatically. It also darkens plants and trees—all, of course, on a nice sunny blue-sky day. A red filter should not be used when photographing people near the camera, for it turns lips and skin (or anything red, for that matter) to a chalky white in the final print.

FILTER FACTORS. When using a filter, you must always increase your exposure somewhat to compensate for the density of the filter, which reduces the amount of light striking your film. Each filter, then, has a "factor" which tells you how much to open your lens when that filter is in place. Generally, you increase one stop for medium yellow, two stops for light green, and three for red.

Color Composition

Color film presents problems entirely different from those of black-and-white film, because, even though the lighting ratio of highlight to shadow may be uniform (1:1), the color contrast of your subject is sufficient to create a good composition which will be an interesting one besides.

Color composition involves *color harmony* and *color contrasts: cool* and *warm* colors; *advancing* and *receding* colors.

The color wheel is a starting point for selecting colors that harmonize or contrast with one another. Opposite colors on the color wheel are contrasty; adjacent colors harmonize.

The **warm colors** are yellow, orange, and red; the **cool colors** are violet, blue, and green. **Receding colors** are at the blue end of the spectrum. **Advancing colors** are at the red end. Notice how much nearer a fiery red sky seems to be in contrast with a blue sky. The blending of these color elements into the general scheme of the picture will occur when you both think and practice using colors.

BASIC AVAILABLE-LIGHT SHOT II

The Available-Light Shooting Program

PROJECT. Shooting Basic Available-Light Shot IIa, normal exposure.

CAMERA. Any camera having an *f*/3.5 lens or better.

FILM AND FILM RATINGS: *Black and White Film.* Kodak Tri-X is a good film to start with. It comes in many sizes, rated at ASA 160 to 200; but, practically speaking, it can be shot up to ASA 400 in low light situations without any change in development. When using Tri-X indoors for available light, then when taking outdoor shots on the same roll it's often a good idea to cut the outdoor exposures with a medium yellow (K2) or neutral density filter.

For *really* low light situations, you might try Agfa Isopan Record at ASA 1300 or Kodak Royal-X at ASA 1600. Never use either of these films in daylight, though.

Color Transparency. High-Speed Ektachrome, Type B, has an exposure index rating of 125.

AN INTERESTING PICTURE. Available-light pictures in themselves are different. Contrasts are great and interesting. It *is* fun merely to take a trip at night for photographing your city because you really never know what you have captured on film until it has been developed and/or printed.

A SHARP PICTURE. The dimness of the light throws a greater responsibility on your focusing technique because the wider openings have a shallower depth of sharpness. The dimness of the light, too, presupposes slower shutter speeds, so that camera handling technique also assumes a far greater importance than that for daylight shooting. The minimum hand-held, available-light shooting speed usually is at 1/25 or 1/30. Therefore, a good habit to learn is that of bracing yourself against a wall or a stationary auto, leaning on the back of a chair or on the arm of a sofa, etc., to minimize camera vibration at slower-speeds as the shutter is released. Although a tripod may be used, in the long run it is a detriment to spontaneity because it prevents you from hopping around freely to concentrate on your subject. Then, too, the subject is bound to "freeze" more often when a tripod is in view. The decision of whether a tripod should or should not be used must be your own, since what you gain by spontaneity may be lost by camera motion and lack of sharpness.

A WELL-LIGHTED PICTURE. There is nothing you can do about the

dim lighting present on the scene. However, unless the dramatic intent requires it, it is far better to wait a moment until the subject receives some front lighting from a chandelier or a wall light, say, since the absence of lighting produces a heavy shadow whereas reflected light will create an interesting highlight. Of course, if you cannot wait, shoot at the peak of motion or emotion; a shot in time is worth more than ten that "might have been" better.

A WELL-COMPOSED PICTURE. Although most available-light pictures are spontaneous pictures, the habit of both focusing and composing the picture at the same time will gradually develop into a sense of proportion so that you will do so automatically. A well-composed picture sits in its frame as though it belonged there, and this quality will, of course, enhance the value of your picture. A poorly composed picture creates uncertainty in the mind of the viewer because he is never completely satisfied with it even though he may not know why.

A WELL-EXPOSED, NORMAL PICTURE. The normal exposure is made by setting the exposure meter at an EI of 400 for Tri-X, 1300 for Agfa Isopan Record, and 1600 for Royal-X Pan.

We can now take an exposure reading of the scene because we know (1) the name of the film and (2) the EI at which the picture will be shot.

A Dynamic Exposure Reading

It's often difficult to adjust for variations in exposure in a room where situations are constantly changing or where, if you try to get close to your subject, you destroy its spontaneity.

In practice, you often find in an available-light situation—a room or a locale, that is—that the light is more or less the same for exposure purposes wherever your subjects move (assuming, of course, there is any light at all). The *2X hand method* of exposure reading can be used when you can't get close. Simply extend your palm so that the light source shines on it, then read your exposure meter held about 6″ or 8″ from your hand. Double the reading when setting your camera before exposing.

Once you get a basic reading for a certain series of shots, you needn't change exposure unless there is a radical change in the intensity of your light. If there is some variation in a room, open up about ½ to 1 stop for darker areas, or close down the same amount for brighter areas. In any case, learn to take accurate exposure readings and you need never worry about poor exposures.

A word of caution: learn also to "see" the way light and shadow falls in an available-light situation. Your eyes will always tell you if there are strong shadows on somebody's face. Simply learn to see them in advance and you won't have to wait until your pictures have been printed to know whether or not you "got" good ones.

Be Safe—Develop by Inspection!

PREPARATION. Professional photographers cannot afford to take the chance of underdeveloping or overdeveloping their negatives. They develop their films by inspection, observing the film as it develops, under carefully planned conditions of lighting the darkroom with a No. 3 Wratten dark green filter over the safelight.

Inspection, itself, requires a certain amount of experience to judge the end point of the development. There is a short cut to acquiring an experienced eye for this technique:

1. Select a successful negative that shows fine gradation not only in the highlights but also in the shadows. This will be your comparison negative. The short-cut technique that will make you adept consists of binding this negative to the front of the Wratten No. 3 safelight. This will duplicate the approximate appearance of the negative as it is being developed while the green antihalation backing is still part of the film.

2. A safelight must be fitted with a Wratten No. 3 filter. The film is loaded in the darkroom into the light-tight developing tank made for it. The green light is turned on while the film is being developed so that you may become accustomed to it.

Important! After about 50% development has been completed (i.e., 5 min. if the normal developing time is 10 min.), the tank should be opened, the reel or sheet film fitted, and a portion of film quickly unwound from the reel. The film is held about 2′ from the safelight with the emulsion side up. The shadow area where you will want detail is compared with the shadow area of the safelight-bound comparison negative. The appearance of the shadow of the developing negative will tell you whether or not the film was properly exposed and how soon development will be completed.

3. A maximum of 10 sec. is permitted for this decision. Actually, you should be able to do it in 2 or 3 sec.

4. The first quick look will give you some idea of how much more development is required. After the approximate time has elapsed, you can take another quick look to decide whether or not the negative is properly "cooked."

5. Your initial glance at the film will suggest these alternatives: (a) The film has been grossly overexposed and the film should be immediately rinsed and placed in the fixer; (b) the film is developing normally and will be finished within normal developing time; (c) the film has been grossly underexposed and requires a vigorous developer such as DK-60a, to really bring up the image so that the negative will be usable.

BASIC DIRECT-FLASH SHOT III

Differences Between Flash Sources

Direct flash means aiming a flash lamp or an electronic flash directly at the subject. A flash source of light is a packaged concentrate of illumination. It is called a flash lamp when it can be used only once. It is called an electronic flash when it is battery-operated and can be used again and again. A direct-flash shot is perhaps the easiest to take because you are carrying your lighting with you and it will uniformly illuminate your subject with frontal light. Both direct-flash lamp and direct-electronic flash shots are taken in the same way—by directly aiming the reflector at the subject.

Exposure must be calculated in a way different from that for daylight photography because the duration of the flash is too short to be measured by convenient exposure-meter means. The lamp-to-subject distance is the most critical factor because the light loses its power the farther it is from the subject.

REMINDER: Moving the lamp twice nearer (for example, from 12′ to 6′) increases the amount of light falling on the subject by 4 times (4X), and moving the light twice farther away, from 12′ to 24′, decreases the amount of light at a ratio of one-quarter that of the initial distance. At 24′, in our example, the light is one-quarter the strength that it is at 12′. Therefore the lamp-to-subject distance must be reasonably accurate. Otherwise the flash will be too strong and overexpose the film, or too weak and cause underexposure. If the light is weak, the subject will be dark (underexposed). If the light is too strong, the subject will be too light, and highlight detail will be obscured (washed out). Direct flash has a drawback in that it may produce harsh shadows if it strikes the subject from the side or is insufficiently removed from a subject that has depth. If the lamp, for example, is 6′ from a subject that is 18′ in depth, the light reaching the rear portion of this subject will have ⅑ of the portion of the subject nearer the flash. In a case like this, hold the flash high and angle it down toward the rear part of the subject.

Selecting the Flash Source

When you are selecting the kind of flash you want to form a flash system, you will find that both flash lamps and speedlights are available in various sizes, strengths, and characteristic ignition types. Every flash must be synchronized to the opening of the shutter because the flash

peak lasts approximately 1/50 sec. for some flash lamps and is often about 1/500 to 1/1000 sec. for speedlights. The flash must "go off" while the shutter is open. Here are some of the common flashbulbs and what they do:

1. CLASS F BULBS. These include the popular midget SM and SF bulbs. These bulbs reach their peak intensity in about 1/200 sec., have a relatively low brightness, and are used most often with simple cameras.

2. CLASS M BULBS. No. 5 and No. 25 bulbs are in this group. They are probably the most common bulbs in use. They require about 1/50 sec. to reach their peaks. They are used with cameras that have between-the-lens shutters.

3. CLASS FP BULBS. These are used with cameras that have a focal-plane shutter to ensure even exposure as the slit in the focal-plane curtain moves across the film. No. 6 and No. FP-26 are in this class.

Using Flashbulbs

When using flashbulbs, you have to be sure, when your bulb reaches its peak intensity after being fired, that the camera's lens will be wide open. That's the whole point of synchronization (or "synch," as it's commonly called). Simple cameras may not be synched at all. They have a B flash setting which allows you to hold your shutter open until the bulb has flashed.

Other cameras may have more than one synch setting, enabling you to use various kinds of bulbs. The two commonest are "M" and "F" settings.

"M" SETTING. This setting is used with No. 5 or No. 25 bulbs. It delays the opening of the shutter just long enough (1/50 sec.) for the flashbulb to reach its peak intensity.

"F" SETTING. This one is used with fast-peak bulbs, and, as you might expect, it delays the shutter's opening by 1/200 sec. until peak intensity.

Electronics Flash

With this device you must have a camera with an "X" synch setting, and you must always set the camera on "X" before taking electronic-flash pictures. If you don't, you may often draw a blank. Unlike a flashbulb, a speedlight has no delay until it reaches peak intensity. It fires instantly, giving off its entire burst of light in anywhere from 1/500 to perhaps 1/2000 sec. If the camera's shutter is not opened at the moment of exposure, you get no picture. The "X" setting guarantees that the shutter will be open.

Film for Direct Flash

Black-and-white film can be used with either flash lamp or electronic flash. Color-positive transparency film should be matched with the color

of the light source: Kodak Ektachrome, Type F, should be used only with a clear, wire-filled flashbulb such as M5, M2 or AG-1 flash lamp, otherwise filters are required.

Determining a True Flash Guide Number

Securing a correct working guide number is a very critical factor since it must really be an accurate guide instead of merely a wishful guess. The correct exposure for a press picture, for example, must be accurate—on the nose—because there are no retakes. Therefore, the exposure for your flash picture will be only as accurate as your guide number.

These guide numbers are printed on the back of each package of flashbulbs as well as on the instruction sheet packed with each roll of film. Guide numbers for each bulb are determined by the sensitivity of the film used and your shutter speed. When you know a bulb's guide number for a particular speed, say 1/100 sec., you can then figure out what aperture to use with that bulb for a subject any given number of feet away.

Let's say that you're using medium-speed film (ASA 160) with No. 5 flashbulbs. You want to make a picture at 15'. Consulting the guide number chart on the back of the flashbulb package, you learn that the guide number for this film is 250 when you use a shutter speed of 1/100. Now, to determine aperture, simply divide your distance into the guide number—in this case 250 divided by 15. The answer, 16⅔, tells you that *f*/16 is the correct aperture for this exposure. (Always use the aperture number nearer your result.)

When using electronic flash, the guide number business becomes even easier. You don't need a series of guide numbers based on shutter speed. You need only *one* guide number, the correct one for the film and unit you are using. Generally the manufacturer supplies these numbers. Once you have *the* number, you use it for any shutter speed, for it is not your camera's speed that determines exposure but rather the very brief flash from your electronic unit.

If you don't know the guide number for a particular film, run this simple test. Set up your wife or a friend in an average-sized room. Take one picture (using color film) at each of your camera's apertures from, say, *f*/3.5 through *f*/16 or *f*/22. Shoot each shot from 10' at 1/125 or 1/100 sec. Have the film processed, then select the best color transparency. Multiply the *f*/stop used for this picture by 10 (your shooting distance), and you have the guide number for that film.

Effects of Walls and Reflection

The instructions above cover average rooms with average ceiling heights and wall color. Sometimes, however, you may find yourself in a room with very bright walls—glaring white, for example. In this case you may want to stop down from ½ to 1 full stop if it's likely that your

flash will reflect from the walls onto your subject. This will prevent overexposure.

On the other hand, black walls absorb light. If it seems likely that that much of the effect of your flash will be lost on very dark surroundings, open your lens ½ to 1 stop to avoid underexposure. The same rule applies in large, dark rooms like gymnasiums or auditoriums, where the walls are some distance away. You may want to open up as many as two stops beyond what your guide number calls for. This will offset the tendency of your flash to be swallowed up by the empty spaces around your subject.

Accurate Lamp-to-Subject Distances

In all direct-flash shooting, the lamp-to-subject distance is closely bound to the *f*/opening of the lens. The two must be co-ordinated so that our essentials for a good picture—sharpness and correct exposure—will be achieved. The easiest method of taking a direct-flash picture is to leave the flash on the camera, set the synchronizing speed and/or shutter speed for the flash, pre-set the distance based on a specific body size (for example, a full body at 10′), and then pre-set the *f*/opening for the specific film. Then approach the subject as you view it, either on the ground-glass or in the rangefinder, and when it appears sharp, snap the S-E-T picture. Make a **SNAP S-E-T CHART** based on this information.

Guide Numbers and Development

The developer used with film exposed to direct flash can influence the ultimate guide number. This is especially true for electronic flash since a powerful developer can often deliver 4 times the film speed as compared with that delivered by a soft-working developer. Therefore, develop your film as suggested by the manufacturer because these developers and developing times should produce the best speed and film quality.

Reference Main Lux Method for Controlled Multiple Speedlighting

The Reference Main Lux method of lighting is a standardized technique for securing a main light reading as reference and then balancing all other lights to it. A single light will produce uniform lighting only when it is on the camera, or slightly above it, facing the subject. When the lamp is moved away from the camera, it produces shadows that may be interesting for a single light effect but usually require fill-in light to produce luminous shadows. For speedlights, the Reference Main Lux method is used in the same way as it is used with photoflood lamps. In every situation involving multiple speedlighting, just as with

photoflood lamps, the exposure is calculated for the main light and the exposure setting is made on the basis of its strength. This setting is the "balance point" for your fill-in light. Your accent light or your background separation light is balanced to the main light, *but the main light exposure setting is never changed!* Here's how it would work for speedlighting a portrait, using one 35-watt second speedlight and two similar slave units.

1. The lamp intensity guide number is found by experience or by consulting the speedlight's instruction manual. When the units are the same, it is bound to be the same for all three units. With Verichrome Pan, the guide number is 80 for each unit.

2. The main light for the portrait will be placed at 5′. By dividing 80 by 5, an f/16 aperture working number is arrived at and set on the camera. This *f*/opening will remain unchanged regardless of where the balancing lights are placed.

3. The fill-in light (the first slave unit) is to be set at a 1:½ ratio. This means that the lamp should be placed at a distance which will require an *f*/11 opening because that is one-half the light entering the lens when the narrower *f*/16 opening is used. Dividing 80 by 11 gives a 7.7′ distance. The slave unit is set at approximately 7′ for a 1:½ fill-in effect.

4. An accent light is to be added to produce a halo effect on the hair. We wish this light to be twice the strength of the main light, and this requires a strength of *f*/22, which is twice the amount of light entering the lens when the *f*/16 opening of the exposure is made. Dividing 80 by 22 indicates a lamp distance of approximately 3½′. Setting the second slave lamp at 3½′ will give us a 1:2 accent light.

5. When the exposure is made with this setup, where the main light reaches the subject, it will cast shadows filled in with half the power of the main light; where the accent light overlights the main light areas it reaches by twice the amount of light, the highlight effect will be far more interesting than without the accent light. With the Reference Lux method, you have a working procedure for solving any similar problem. By using this principle with multiple subjects that are separated by large distances, the problem is attacked in the same way, in that one subject becomes the Reference Main Lux and the other subject is balanced against it with either over-, equal, or subdued lighting ratio, depending on the importance deemed necessary by the purpose for which the picture is taken. A three-light unit is ideal for a portrait-at-home lighting kit because it is light, efficient, and powerful in addition to showing the accepted advantages of speedlighting over flash or floodlighting.

BASIC BOUNCE-FLASH SHOT IV

What Is Bounce Flash?

Bounce-flash is a picture-shooting technique for making the wall, the ceiling, or the floors of a room function as huge reflectors. The flash can remain on the camera, if you so wish, but normally the lamp and the reflector are pointed toward the ceiling. There are other ways for bouncing light, such as pointing the flash at the floor or the wall; however, these methods are classified as more advanced studies. The reflector-to-ceiling method is much simpler at all times. It is important to emphasize at this point that our basic bounce readings used in this chapter are based on an 8′ ceiling. If a 10′ ceiling exists, then open the iris an additional half stop. For a 12′ ceiling, use one stop more than that required for an 8′ ceiling.

ADVANTAGES. Bounce-flash pictures are popular because they produce results which have a natural look and are unmarred by overharsh shadows and are easy to use both with flash lamps and speedlights. The light bounced from the ceiling has a diffused, soft, fill-in effect on the prevailing light so that the mood of the original scene is preserved.

If you standardize bounce flash with our routine shooting program, you will enjoy taking such shots. Bounce pictures are used more and more frequently for these reasons:

1. They have much of the same quality of available-light pictures; that is, they look natural because of the absence of harsh shadows all running the same way.

2. The light is uniform, so that front subjects in a group have approximately the same amount of light reaching them as do the rear rows. With regular direct flash, front groups usually are "burnt up," while rear subjects are scarcely reached.

3. Harsh shadows, such as are bound to occur with a direct-flash camera, are generally eliminated because the walls, the floor, or the ceiling act as primary and secondary reflectors to spread the light in a soft, enveloping manner.

4. Bounce light is comfortable. Your eyes are spared the powerful flash of direct glare which is often blinding. Bounce light is helpful when photographing sensitive people, babies, and small children.

5. Closeups and ultra-closeups are easy to take because short, direct lamp-to-subject distances require very small lens openings. If these do not exist, you must improvise with thin white handkerchiefs, which are both a problem to keep on the flash and to calculate accurately for the exposure setting.

DISADVANTAGES. Color pictures should not be attempted with bounce

light when the walls or ceiling of the room are any other color but pure white. Gray or cream-colored ceilings, green walls, or even brown woodwork can all superimpose their color cast onto the picture.

Film for Bounce Flash

BLACK-AND-WHITE FILM. Use Kodak Verichrome Pan *or* Kodak Plus-X, 160/5.5°. The color of the ceiling for a black-and-white film bounce-light picture is not critical because the reflected cast of the ceiling or the walls does not affect the color balance of the film. Non-white ceilings, however, will reduce the amount of reflected light.

Black-and-White Film Development. Since light bounced from a diffused white ceiling will be "soft" in character, at times you may wish to develop the film approximately 25% longer than normally to produce better subject contrasts. This is particularly true with blonde subjects, if the entire roll is shot with bounce-flash pictures. When a "mixed bag" exists on the film, however, you will have to print some pictures with a paper that has more contrast.

COLOR FILM. Color transparency or color negative is the choice here. The ceiling used for bounce-flash color pictures should be white. Therefore, the ceiling or wall color will determine whether you should use direct flash or bounce flash. If you wish to have the advantages of bounce flash, then shoot color film with the following technique and hope that the color cast of a dirty white, light gray, or cream ceiling will not overpower your subject's natural skin coloration.

Exposing the Film

Flash synchronization for bounce flash is the same as for direct flash. Speedlights must be used at X-synch.

Make Final Check—Then Snap!

Now that our camera is loaded, the flash unit synchronized and in position, we ask ourselves: Will our picture be sharp? Well exposed?

A SHARP PICTURE. Careful focus, as always, is essential if your picture is to be sharp.

A GOOD EXPOSURE. In figuring bounce-light exposures, consider your shooting distance to be the number of feet from flash-to-ceiling plus ceiling-to-subject. This is the distance you divide into your guide number. Then, open up an *extra* stop to take care of loss of light resulting from bouncing.

This system works for both black-and-white and color film. With black-and-white film you can simplify this procedure for white ceilings of normal height. Simply figure the guide number as if you were *not* going to bounce the light. Then add two stops to your result.

Best results come from testing the ceiling of your own home, because then you will have a visual comparison with any other you encounter.

BASIC FLOODLIGHT SHOT V

Advantages of Floodlight

Daylight is free. Flash lighting is convenient and simple. But floodlamps are still used to light pictures because of the following advantages:

1. You *see* your lighting effects—where highlights and shadows fall.
2. Floodlights are inexpensive, available in all camera stores, and last a reasonably long time.
3. The lights can be set up, arranged or rearranged at will, and the exposure intensity can be read with the exposure meter. There are also floodlamp charts you can use.
4. From learning to control the lighting effect of floodlamps, you can apply this knowledge to the control of any house lamp or spotlight in the same way, and the final setup can be read with the exposure meter. Floodlighting is an inexpensive way of learning light control with any subject.
5. Floodlamps have no synchronization problems. Use them at any speed.

Uses of Floodlamps

Floodlamps have proved their place in photography. Portraits or identification pictures, for example, can be taken with floodlamps because the subjects are relatively still; therefore, motion stopping is not a problem. Then, too, floodlamps will last about 6 hours, so that a set of lamps is good for at least a thousand pictures. You should have a set of at least 4 No. 2 photofloods with built-in reflectors, plus two light stands.

Floodlamp pictures can be used in the setups for Basic Floodlight Shot Va Direct Flood, and Basic Floodlight Shot Vb Bounce Flood, as well as other lighting patterns. An exposure meter will measure the intensity in all cases because the lamps are burning continuously and produce a specific amount of visible and measurable light.

FLOODLIGHTED PICTURE ROUTINE. Our complete routine for setting up a floodlamp distance shot considers the usual requirements for a sharp and well-exposed picture.

A Sharp Picture. Floodlighted pictures may require a tripod with slower black-and-white or color films. If the picture is to be hand-held, a 1/50 sec. shutter speed should be used, if possible, to reduce the chances of camera motion. Slower speeds should be used only when absolutely necessary and only after you have practiced shooting at these slower speeds and know you can obtain sharp pictures. If a tripod is

impossible to take along, then at least try to prevent camera movement by bracing the camera securely on a chair or table.

A Well-Exposed Picture. While the lamp-to-subject distance still determines the strength of the light reflected from the subject, you can actually see the light shining on the subject and can read its intensity on an exposure meter. If no meter is handy, then the chart supplied with the lamps will suggest working distances and exposures. Since photo-floodlamps usually are not fitted to the camera, they can be placed anywhere, independent of the camera. In this way the camera can be placed at the best vantage point for angle, direction, or distance so that an interesting picture will result.

Classic Floodlighting Build-Up

Floodlights permit you to see the exact lighting effect as each light is moved around the subject. Because you can see the effect, you can also control it. However, an integrated plan must always be kept in mind, because too many lights without an over-all plan must lead to both visual and photographic confusion, since multiple shadows will occur visually and the lamps will be out of balance photographically.

Follow this step-by-step program for a simple, logical, build-up of lighting effects.

MAIN-LIGHT REQUIREMENTS. There *must* be a single main light source (it may be made up of a number of lamps clustered together but still producing a single main-light effect) to determine the dominant key, or main-light effect. The sun determines this in Basic Outdoor Daylight Shot I. If you do not like the height and the angle of the sun, you must wait for that time of day when the sun's position suits the effect you desire. With floodlighting, of course, the main light can be moved to change its distance, height, and angle to the point where its brightness and shadow effects are desirable. This is possible only because you can see the effects and because floodlighting is continuous lighting, whereas with flash lighting is impossible to see unless pilot lamps are used (a more advanced technique).

MAIN LIGHT DETERMINES EXPOSURE. There must be one main light to determine an exposure reading; otherwise, any exposure reading method falls apart because of a lack of a unifying light idea. If our main light had been set up, and an accent light (for example) were used to produce a highlight on the hair, an exposure reading made on the strength of the accent light would so depress our main-light effect that our subject would appear dark instead of being the brightest image in our picture. Remember: *A reflected-light exposure meter merely measures light intensity; you must determine the point at which the reading is to be made.* As a concrete example, if a portrait exposure is based on the accenting hair light, the film will be underexposed and dark. However, if the exposure is based on the main light alone, no fill-in lights being added at the moment, the face will be bright and the accenting hair light, when it is added to our lighting setup, will record the hair with brilliant accents.

First make a picture with main-light illumination only. When the main light has been placed in position, its exposure value can be read by any of the methods you have previously learned from this book. The better method would be the use of an incident-light meter, or a reading from the Gray Card or the 5X white card. When your main-light reading has been made, select suitable lens-opening/shutter-speed or EV combination and set the exposure controls. This *will be your exposure setting.*

MAIN-LIGHT, ONE-LAMP LIGHTING. A main light alone can make a good picture. Flash-on-the-camera, as an example of a single main light, does produce excellent pictures every day. However, more interesting effects are possible when the main light is moved *away* from the camera position. For this reason, the classic 45° position is favored in portraiture. The main lamp is placed to one side of the camera at a 45° angle to the subject, and its height is at 45° to the subject, pointing down. This lamp position illuminates some subject areas and misses others. A single main light can lend itself to dramatic treatment because the highlights are at maximum contrast to the unfilled shadows. However, for a less dramatic effect, the dark areas should show detail.

FILL-IN LIGHTS. Additional lights, called *fill-in* or *fill* lights, are brought to bear on the subject. An additional light can be another floodlamp, and it is generally used next to the camera on the side of the lens opposite the main-light position. Thus, if the main light is set to the right of the camera, the fill-in light is placed to the left of the camera.

Fill-in Light Strength. The fill-in light *must not be stronger* than the main light because it would then supplant the main light and upset all previous exposure settings and subsequent lighting balance calculations. If the two lights are equal, then a 1:1 lighting situation is produced. In this case, take a meter reading with both lights turned on. When the fill light really is acting as a fill, it probably will be only half as strong as the main light, or less. In this case, the fill would not affect exposure very much.

Warning: Two No. 2 photofloods is the limit for any one household circuit protected by a 15-amp. fuse. If you add additional lights to this circuit you probably will blow the fuse. So either use other circuits as you add lights, or draw current from a heavy-duty line with a heavier fuse.

ACCENT LIGHT. More photographic interest is generated by accenting the hair of your subject. The accent can also be on any area of a flower, of a shoe, of a table top, etc. The accent effect is usually produced with another floodlamp which shines from a backlighted position. The accenting lamp can be equal to, or even in a ratio of 1:2 (twice) the main-light strength. However, the accent light *must not* be used to determine exposure. In fact, the accent light will spoil an exposure reading if it is turned on while the main-light exposure reading is being made.

Balancing the Accent Light. With all other lamps turned off, bring the accent lamp sufficiently near so that it throws a nice gleam on the

hair. Then make sure that none of the light spills over onto the subject's face.

Accent-Light Strength Considerations. A person with dark hair requires more accenting light than an individual with lighter hair because black absorbs light. (The color of an individual's hair is used as an example throughout this discussion because you can both visualize the lighting effects and test each light).

SEPARATION LIGHT. A background may be black and thus not require any light. With lighter colors, it is best to add light to obtain the tone of gray that is necessary for the picture. A white background, for example, can be made to photograph almost any shade of gray by controlling the amount of light that falls on it. If the light on the background is 5X the basic exposure, the white wall will photograph white. If the white wall reflects the same amount of light as the main exposure, it will reproduce as a medium gray. If it reflects less light than the basic exposure, then the wall will be darker, all depending on the amount of light reflecting from it.

As an example again, if the basic exposure is 1/50 sec. at *f*/5.6, the light reflected from the wall would have to be so strong that it would require an exposure of *f*/12.7 at 1/50 sec. If the wall requires, too, an exposure setting of 1/50 at *f*/5.6, then the white wall will be rendered a medium gray because our meter is so calibrated that whatever it sees, it converts into a medium-gray value.

Use the Safe Floodlamp Build-Up

The classic floodlamp build-up is safest when you have both time and sufficient lamps. The diagram in the Factopedia for Basic Floodlamp Shot Va Direct Light is a safe system because you have a main light at a sufficient distance to produce small shadows and because the two accenting backlights are so placed that the subject is always reflecting light from either side and cannot be lost against the background.

By using this shooting program and recording all pertinent effects, a Basic Floodlamp Shot Va Direct Light should make this type of picture always photographically excellent. It will answer your mechanical and technical problems so that your full attention can be devoted to your subject. After all, your subject is your most important consideration, because your viewers are not really interested in how the picture was taken. The importance of your technique is relative only with regard to its contribution in reproducing your subject to greatest advantage.

BASIC DIRECT LIGHT FLOODLIGHT SHOT Va

Film: Black-and-white, ASA 125 or 160.

Subject: Half-body size of a person.

Sharpness: Set the distance at 5'. Remember to compensate for viewfinder parallax.

Lamp: Two No. 2 reflector photofloods on a light stand.

Lighting: Place each lamp at a 45° angle to the front of the subject

and 4′ away from it. One lamp should be 1½′ higher than the subject, pointing toward the chest.

Exposure Reading. Take the reflected reading from the subject directly or from the Direct-Reading Exposure Card in this book.

Exposure Setting. The illustrated example requires *f*/11 at 1/25 sec. Secure the best pose, etc., before releasing the shutter.

BASIC FLOODLIGHT SHOT VIb BOUNCE FLOOD. The photographic effects of bounce-flood pictures are similar to those from bounce flash. The bounce-flood method is useful to boost the low intensity of dimly lighted rooms.

For bounce flood, the lamps are placed where you think they will retain the feel of the original lighting, because bounce flood correctly placed complements rather than supplements regular available light.

Since a relatively fast shutter speed is always important for living subjects, it may be advisable to have as many as 4 floodlamps (on *two* circuits to save fuses) in use at one time. The general requirements for the bounce-flood method are:

B&W Film: Tri-X, ASA 400.

Subject: People in an average room of a house.

Sharpness: Pre-set the focusing scale for any specific body size or focus at random with a 9′ or 10′ setting.

Lamps: One No. 2 reflector photoflood on a lighting stand.

Lighting: The lamp is placed on the lighting stand pointed toward the ceiling and jockeyed around to retain the natural room-lighting effect. Be sure that the flood is outside the picture field; it must not show in the final picture.

Exposure Reading. Take a reflection reading from the Gray Card at a 5′ height in an 8′ room. The rule is to take it at approximately two-thirds the height of any room. Take it from a few directions and average the results.

Exposure Setting. The meter reading for this setup in a 15′ by 15′ room having an 8′ white ceiling should be about *f*/4 at 1/50 sec. When a meter cannot be used, then use the direct floodlamp chart in the Factopedia. It tells you the lamp-to-subject distance for Basic Floodlight Shot Va Direct Light. Now estimate the direct lamp-to-subject distance; set the lamps; point the lamps toward the ceiling, and make the bounce-flood exposure setting by opening the iris 2½ stops wider, or set the shutter speed 2½ times slower, for the lamps "bounced" from the ceiling.

Hints

Color bounce photography should be attempted only in a room having white walls and a white ceiling. If the walls and the ceiling are colored, it is advisable to make a white tent, using a white paper or light-linen reflection screen. White or perhaps light cream are the only acceptable colors because colored walls plus colored ceilings reflect and add their own colors to your pictures.

BASIC CLOSEUP SHOT VIa— CLOSEUP PORTRAIT LENSES

The Realism of Closeups

Closeups are different. Have you ever really "seen" an insect, the head of a bird, the eye of a dog at 4 inches? Their closeup appearance differs entirely from what you generally accept them to be at the normal viewing distance at which we usually examine objects. Table tops, too, are mental images as well as photographic exercises. They, too, are usually best taken as closeups.

A closeup differs from a regular shot because you are shooting pictures at distances nearer than the focusing-scale settings. Most regular camera lenses focus between 40" and 30" from the subject, though some go as close as 18". Look at your focusing scale and it will tell you the near-point of focus. With special closeup lenses, your camera can be focused as near as 4" from the subject.

What Is a Closeup?

The term *closeup* has been used generally. It should be more definitive, for you will then be better able to understand the photographic scope of a closeup. You can arrive at a definition, an arbitrary definition, by defining these three categories:

1. A REGULAR SHOT. A regular shot can be defined as a picture taken at any distance between infinity and the near-focus setting (lowest distance setting on your camera) of your lens.

2. A CLOSEUP SHOT. Anything photographed closer than the near-focus setting on your camera is a closeup picture.

3. A NATURAL-SIZE PICTURE. A natural-size picture is one dimensionally proportional in a ratio of 1:1. That is, the subject size is the same size as the film. For instance, an object 1" by 1½" will completely fill the frame of a 35mm film, and an object 2¼" square will fill the full 2¼" frame size.

Closeup Photography Equipment

Closeups are different; therefore, you will logically wish to take them both for fun and as a photographic technical exercise. Let us practice step by step so that you will become used to the idea of reducing the complexity of technical problems to a simple procedure. Since the subject is different, you need only remember our original basic concept—to make a sharp picture and a well-exposed picture.

THE CAMERA. Any adjustable camera can be used for Basic Closeup Shot VIa Closeup Portrait Lenses. Some are easier to use than others because special closeup equipment has been designed for them.

SPECIAL CLOSEUP EQUIPMENT:

1. Closeup portrait lens in strengths +1 to +10.
2. Special adapters, where necessary, for the portrait lenses.
3. Focal frame.
4. Tape measure.
5. Ruler.

Program for Sharp, Well-Exposed Closeup Pictures

Shooting closeups should follow a well-defined program because many factors contribute to the making of an exposure. Forgetting even a single step can spoil the entire picture. Therefore, learning and following a closeup shooting program is your best insurance that your pictures will all "come out" the way you expect.

CLOSEUP BACKGROUND. The background must be kept as simple as possible. It must not compete for attention with the main subject. If the natural background of your subject is too competitive, as would be the case of a small flower against an irregular brush background, then use a window shade, a piece of neutral cardboard, or even a piece of black velvet, as these will tend to concentrate all the attention on the subject.

A DIFFERENT PICTURE. Plan a different picture. This should be easy because closeups in general are already different and require a minimum of arrangement for satisfying compositions. The subject should fill two-thirds of your frame for optimum size and adequate breathing room. The following step-by-step program tells exactly how pictures should be taken:

1. Secure and fit the correct closeup lens accessories.
2. Set the focusing scale for the necessary closeup distance.
3. Measure the subject-to-lens distance, check viewfinder parallax and composition.
4. Light the subject and read the necessary exposure by the best suitable method.
5. Set the exposure and shoot the picture.

A SHARP PICTURE. As the regular camera lens focuses only to within a limited distance, small objects can be photographed only by bringing the camera nearer to the subject than the minimum focusing-scale distance allows. To make an object sharp at these near distances, special closeup lenses must be fitted over the regular camera lens.

When you look at the closeup chart or the fieldfinder graph in the Factopedia, you will note that the field size is the first point that must be satisfied. You must know the dimensions of your subject because this will determine the remaining steps of the closeup routine. The height and the width dimensions of your subject can be found in either of two ways: (1) The object can be placed on the graph in the Factopedia, or (2) it can be measured with a ruler.

Once the dimensions are found, then the reproduction ratio is checked, because it may be more advisable to use a larger field size if a life-size enlargement should be needed for a specific purpose in the future.

CORRECT CLOSEUP LENS. The camera makeup is next in importance because the specific portrait lenses needed for the closeup distance must be fitted onto the camera. Doing this in a routine methodical manner will prevent errors which are not supposed to happen but *do* happen because of oversight.

The new point of focus for closeups is determined by the positive power of the closeup lens, which is also called a portrait lens. The power is derived by dividing the focusing distance of the closeup lens into 40. The 40 stands for 40″ (the average near-focus distance of the regular camera lens), approximately 1 meter.

A +1 lens would have a focusing distance of 40″ because 40/40 equals 1. A +2 portrait lens would have a focusing distance of 20″ because 40/20 equals 2. For this reason, the lenses are classified as a +1, a +2, a +3 lens, etc. By dividing a +3 lens, for example, into 40, the answer will be 40/3, or approximately a 13″ focusing distance. Therefore, a +10 portrait lens will have a 40/10, or a focusing distance of 4″.

These new near-distances are not shown on the regular focusing-scale distance setting of your camera because the portrait lens changes the focus of the regular camera lens to its own focusing distance. Intermediate focusing-point distances for +1 which will focus between 40″ and 20″ are possible. It is theoretically possible to focus at 30″. In practical use, it is better to select a few set distances which produce a uniform reduction in field size than to try to check possible intermediate distance. The focusing reflex cameras are much easier to use for intermediate distance settings because you see the field size with every change of subject-to-lens distance. But even then, you will find that you can work more rapidly by pre-setting the focusing scale to a fixed reduction ratio and then moving the camera back and forth until the picture is sharp. This is much better than trying continuously to get a variable intermediate distance setting.

Portrait lenses can be stacked one on top of another so that a +3 can be made by adding together a +1 and a +2. A +6 can be made with a +1 and a +5. Some firms manufacture a single +10 lens, and this can be bought from your camera dealer.

FOCUSING FOR CLOSEUP DISTANCE. The focus setting on the distance scale may remain at infinity or it may be set at 4′, depending on the data supplied by the closeup chart. The setting of infinity or 4′ is not an indication of the camera-to-subject distance, because the portrait lens changes the focusing distance for the camera lens. These settings of infinity or 4′ are needed to maintain a sharp focus for intermediate close distances.

MEASURING SUBJECT-TO-LENS DISTANCE. Subject-to-lens distance is now read from the chart. Either the camera can be brought to the

subject, or the subject brought to the camera lens, depending on the type of subject.

The focal frame, a fixed-focus device made of wire or channeled tubing, can be used to show the subject-to-lens distance. It has the superior advantage of simultaneously showing the point of sharpness as well as framing the subject. Your camera dealer can tell you about available focal frames.

CLOSEUP VIEWFINDER PARALLAX. The difference in viewpoint between the viewfinder and the lens of the 35mm cameras and the top-viewing and bottom-focusing lens of the twin-lens reflex cameras becomes acute at near distances. The closeup correction device for 35mm cameras usually has a prism incorporated in the viewfinder section of the device. The prism corrects both vertical and lateral parallax.

CLOSEUP COMPOSITION. The rules for closeup composition are the same as those applicable to any subject or any type of photography.

At this point, we know the point of sharp focus, and that our subject is framed correctly. To assure the greatest possible range of sharpness, the picture should be taken at *f*/22 whenever possible. You can help narrow the problem of sharpness in depth by keeping your subject in a flat plane. This means that the subject should be as nearly parallel to the film as possible. If a hand of a statue is jutting into the picture, turn it to a three-quarter view, if possible, so that the entire subject will be sharp and undistorted. Otherwise, the tip of the hand may be unsharp and appear overlarge because of its near-position distortion.

A WELL-LIGHTED PICTURE. Closeups may be taken with any of the basic light sources. They can be taken of such natural outdoor subjects as flowers, frogs, etc., or indoors of the same subjects under the controlled lighting of direct flash or direct floodlamps.

CLOSEUPS WITH DIRECT FLOODLAMPS. The No. 2 photoflood of our basic equipment are selected because: they are available in most camera stores—they have a concentrated light source—they may be used for black-and-white, color, still, and movie photography—they will burn for 6 hours—and they permit a fast enough shutter speed for most pictures. Their all-around use makes them most valuable and, incidentally, inexpensive additions. Moreover, you can actually see what the finished picture will look like, whereas flashlamps still leave something to chance.

LIGHTING ARRANGEMENTS. Light the subject from a 45° angle at equal distances. This produces a numerical lighting balance of 1:1. The best lighting distance is based on the depth of the subject. The light should be placed at a distance at least 4 times the depth of the object, to ensure a uniform front-to-back illumination. An object 4" in depth should be lighted from a 16" lamp-to-subject distance. If the lamp is placed too close to the subject, there will be an abrupt light fall-off which could make the rear of the subject and its background appear coal black.

This 4-times object-depth distance applies to floodlamps and flash lamps as well as to speedlights.

Setting the Exposure

BASIC EXPOSURE READING. Different exposure readings must be taken for either of the two lighting conditions of floodlights or flash.

1. *Direct Floodlighting (Basic Floodlight Shot Va Direct Flood).* The basic exposure for direct floodlamps, fluorescents, or house lamps (with the lamps turned on) is read from the object position with the Direct-Reading Exposure Card because the subject may be too small to be read accurately otherwise. Read only one light, if two lamps are equidistant. If the exposure is read with both lamps turned on, the exposure setting will depress shadows and highlights.

2. *Basic Direct-Flash Shot III.* Flash lamps or speedlight exposures are calculated by dividing the lamp-to-subject distance by the manufacturer's recommended guide (power) number. Check the synchronizing lever to make sure that it is set properly for flashbulbs, if those are used, or at X for speedlights.

CONSTANT EXPOSURE SETTING. The exposure-setting advantage of portrait closeup lenses is that the *f*/settings remain the same with extension lamps (whether speedlight, flashlight or floodlight) set at a specific lamp-to-object distance. The *f*/opening remains the same regardless of the nearness of the camera to the subject because the lamp-to-subject distance determines the exposure. So, set the lamp-to-subject distance close enough for *f*/22 to be used, and then any closeup lens that you need without altering the basic exposure settings.

FLASH EXTENSION CORD. When the camera is less than 3½" from the subject, the flash should be removed from the camera and an extension cord inserted between the camera and the flash so that the camera may then be brought forward and focused at the nearer distance. The flash can then be brought back to the correct distance for a well-exposed picture at *f*/22.

FLASH WITHOUT EXTENSION CORDS. If the flash must remain on the camera, then the intensity of the speedlight or flash lamp must be reduced with thin white handkerchiefs. For this reason, as you may have noticed, the chart mentions two thin white handkerchiefs for reducing the amount of light of the speedlight at the 3½′ distance.

Color Film—Light Source—Color Filter Chart (Courtesy, G.[illegible] Co.)

Film	Daylight		3800°K AG-1, M5, M2, No. 5, 6, 8, 11, 22, 31, 50 Flashbulbs		3400°K Photoflood		3400°K SM Flash		3200°K Tungsten		6000°K Blue Flashbulbs	
	E.I.*	Filter	E.I.*	Filter	E.I.*	Filter	E.I.*	Filter	E.I.*	Filter	E.I.*	Filter
Kodachrome "F"	10	85C	16	none	12	82A	8	82B	8	82C	10	85C
Kodachrome "A"	10	85	12	81C	16	none	16	none	12	82A	10	85
Kodachrome Daylight	10	none	5	80C	5	80B	5	80B	5	80A+ 82A	10	none
Kodachrome II "A"	25	85	30	81C	40	none	40	none	30	82A	25	85
Kodachrome II Daylight	25	none	12	80C	12	80B	12	80B	12	80A+ 82A	25	none
Ektachrome "F"	16	85C	25	none	16	82A	12	82B	12	82C	16	85C
Ektachrome Daylight	32	none	16	80C	12	80B	12	80B	16	80A+ 82A	32	none
Anscochrome Daylight	32	none	—	—	8	80A	8	80A	8	80B	32	none
Super Anscochrome Daylight	100	none	—	—	25	80A	25	80A	25	80B	100	none
Super Anscochrome Tungsten	80	85B	64	81D	80	81A	100	none	100	none	80	85B
High-Speed Ektachrome Daylight	160	none	80	80C	80	80B	80	80B	80	80A+ 82A	160	none
High-Speed Ektachrome Tungsten	80	85B	80	81C	100	81A	100	81A	125	none	80	85B

For color film: Routine use of a Wratten 1A filter is advised for daylight color film. It reduces distant haze and warms the blue colors slightly with a more pleasing effect.

Kodachrome II Daylight and Kodachrome II"A": an improved Kodachrome 2½ X faster with better color rendition and color saturation. There are no immediate plans for Kodachrome II, Type F.

The Additive Unit System

The proposed new additive unit system is based on a geometric concept of film speeds, light intensity, shutter speeds, and aperture markings. Each unit is double another. It simplifies the astronomical numbers of our current and future emulsion speed ratings. Since it is difficult to design dials which will take numbers like 13,000 and higher, therefore the proposed numbers, being geometric are smaller. A number 0° indicates the old ASA 3, 1° indicates number 6, and so forth, as follows:*

0°	3	7°	400
1°	6	8°	800
2°	12	9°	1600
3°	25	10°	3200
4°	50	11°	6400
5°	100	12°	13,000
6°	200		

Color Temperatures (°K) of Common Light Sources and Decamired Values (DMV)

°K	*DMV*	
1800°	56	Candle flame
2200°	45	Drying, heat, red ray lamps
2400-3100°	36	Home incandescent light lamps
3200°	31	Commercial photographic color lamps
3300°	30	SM-SF flash lamps
3350°	30	CP lamps for color photography
3400°	29	Photofloods
3500°	28	White fluorescents or sun, 1 hour after sunrise
3800°	26	Regular photoflash
4400°	23	Sun, 2 hours after sunrise
4500°	22	Bright-white fluorescents
4800°	20	Blue daylight photofloods
5500°	18	Average noonday sun
6000°	16	Blue (daylight) photoflash
6500°	15	Speedlight
7000°	14	Uniform overcast sky
10,000°	10	Blue sky
20,000°	5	North blue sky

Color Conversion Filters

Film	*Basic Daylight Shot* *Noon*	*White Sky*	*Early A.M. Late P.M.*	*Basic available Light Shot II Home Lamps*	*Basic Direct Flash Shot III* *Blue 6000°K Flash*	*Clear 3800°K*	*SM, SF 3400°K*	*Speed Light*	*Basic Flood Lamp Shot V* *3400°K*	*Studio 3200°K*
Daylight 5500°K	none	1A	82A	80B+82A	none	80C	80B	none	80B	80B+82A
(Filter Factor)	same E.I.	same E.I.	1.5X e.g. 32 becomes 25	4X e.g. 100 becomes 25	same E.I.	2X e.g. 32 becomes 16	3X e.g. 32 becomes 12	same E.I.	3X	4X
Type F 3800°K (Filter factor)	85C 1.5X	85C 1.5X	85C 1.5X	82C 2X	N-R N-R	none same E.I.	82A 1.3X	N-R N-R	82A 1.3X	82C 1.6X
Kodacolor (Filter factor)	none same E.I.	none same E.I.	82A 1.5X	82C 2X	N-R N-R	none same E.I.	82A 1.6X	85 2X	82A 1.6X	82C 2X
Type A 3400°K (Filter factor)	85 1.6X	85 1.6X	85 1.6X	82A 1.3X	N-R N-R	81C 1.3	none same E.I.	N-R N-R	none same E.I.	82A 1.3X
Type B 3200°K (Filter factor)	85B 1.5X	85B 1.5X	85B 1.5X	none same E.I.	N-R N-R	81C same E.I.	81A same E.I.	85B 1.5X	81A same E.I.	none same E.I.

To use the guide. If High-Speed Ektachrome, E.I. 160 is used with speedlight, then the color filter required is an 85B, the exposure index becomes 80, and you consult your chart under filter with an E.I. 80 to find the guide number for this speedlight with the filter.

85 Converts Type A } Color film for outdoor use
85B Converts Type B } Color film for outdoor use
85C Converts Type F } Color film for outdoor use
80B Converts Daylight color film for 3200° K or 3400° K photoflood use
80C Converts Daylight color film for 3800° K clear flash use

Kodak Color Light Balancing Filters (Courtesy, Eastman Kodak Co.)

Bluish Filters		*Exposure Increase in Stops**	*Yellowish Filters*		*Exposure Increase in Stops**
Wratten	*DMV*				
No. 82 (CC3)	B2	⅓	No. 81 (CC13)	R2	⅓
No. 82A (CC4)	B2	⅓	No. 81A (CC14)	R2	⅓
No. 82B (CC5)	B3	⅔	No. 81B (CC15)	R3	⅓
No. 82C (CC6)	B5	⅔	No. 81C	R5	⅓
			No. 81D	R5	⅔
			No. 81 EF	R5	⅔

*These values are approximate. For critical work, they should be checked by practical tests, especially if more than one filter is used.

ASA, BSI, DIN Conversion Chart

A.V.	*ASA*	*BSI*	*DIN*		*ASA*	*BSI*	*DIN*
0°	3	15°	6°	7°	400	37°	27°
1°	6	19°	9°	8°	800	40°	30°
2°	12	22°	12°	9°	1600	43°	33°
3°	25	25°	15°	10°	3000	46°	36°
4°	50	28°	18°	11°	6000	49°	39°
5°	100	31°	21°	12°	12000	52°	42°
6°	200	34°	24°	13°	24000	55°	45°

BSI rating: Every additional B3° means an increase of 100% in the BSI Exposure Index. Every B1° indicates ⅓ difference in speed between adjoining ratings.

DIN rating: Every additional DIN 3° means an increase of 100% in the DIN Exposure Index. Every D1° indicates a ⅓ difference in speed between adjoining ratings.

For example, ASA 80 would be B30°, D10°, or APEX 4.5°
ASA 100 would be B31°, D21°, or APEX 5°
ASA 160 would be B33°, D23°, or APEX 5.5°
ASA 650 would be B39°, D29°, or APEX 7.5°

Apex Value (A.V. abbreviation) for the film speed compared to the other systems. Intermediate values are possible. A.V. 5.5° indicates an ASA 160, or BSI 33°, or DIN 23°.

Color Correction for Fluorescent Lamps

Ansco Films with Fluorescent Lamps	*Filters for Daylight Film*	*Filter Factor*	*Filters for Tungsten Film*	*Filter Factor*
Daylight type fluorescent lamps:				
Soft white	10R + 30Y	⅔	10B + 30C	1
Standard cool white	10R + 30Y	⅔	10B + 10C	⅔
Daylight	50R + 50Y	1⅔	10B	⅓
Indoor type fluorescent lamps:				
Standard warm white	10R + 20Y	⅔	10B + 30C	1
Deluxe warm white	10R + 20Y	⅔	20B + 30C	1⅓
White	20R + 20Y	⅔	20B + 20C	1

Kodak Color Compensating Filters and Filter Factors for Use with G-E and Sylvania Fluorescent Lamps

Film	*Daylight*	*White*	*Warm White**	*Cool White*
Kodachrome, Type A	N.R.†	CC-10Y+ CC-30M +½ stop	CC-30M +½ stop	CC-40Y+ CC-30M +1½ stop
Kodachrome, Type F	N.R.†	CC-30M +½ stop	CC-10C+ CC-30M +1 stop	CC-30M+ CC-20Y +1 stop
Kodachrome, Daylight Type	CC-30M+10Y +1 stop	N.R.†	N.R.†	N.R.†
Kodak Ektachrome, Type B	N.R.†	CC-30R +½ stop	CC-20R +½ stop	CC-50Y+40M +1½ stop
Kodak Ektachrome, Type F	N.R.†	CC-20R +½ stop	CC-10M +⅓ stop	CC-30M+ CC-20Y +1 stop
Kodak Ektachrome, Daylight Type	CC-30R +½ stop	N.R.†	N.R.†	N.R.†

*G-E only.
†N.R. = not recommended.

Black-and-White Corrected Film Exposure Indexes—Ready for Exposure Calculation (D-Daylight, T-Tungsten)

KODAK *35mm and Bantam Miniature Camera Films:*	*Exposure Number*	*New*
Royal-X	1300	8.5°
Tri-X	400	7°
Plus-X (35mm)	160	5.5°
Panatomic-X	50	3°
Infrared (with No. 25 Kodak Wratten A Filter) (35mm)	**	20T

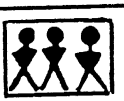
Shutter Speeds for "Stopping" Moving Subjects

Subject at 25′ from Camera	*Line of Motion*		
	D	O	A
Walking at 5 m.p.h.	1/25	1/50	1/100
Children playing	1/50	1/100	1/150
Street activity	1/50	1/100	1/150
Swimmers, skaters	1/50	1/100	1/150
Vehicles at 20 m.p.h.	1/100	1/200	1/300
Football, running	1/100	1/200	1/300
Vehicles at 40 m.p.h.	1/200	1/400	1/600
Tennis	1/300	1/600	1/900
Horse race	1/500	1/1000	1/1500
Airplanes	1/500	1/1000	1/1500

Note: When your subject is at 50′, multiply all speeds by 2 (1/100 X 2= 1/50). For 100′ subject distances, multiply all speeds by 4 (1/100 X 4= 1/25).

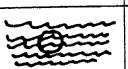
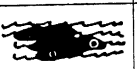
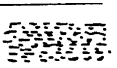
D = Directly to or from the camera view.
O = Obliquely to or from the camera view.
A = Across the camera view.

A Sharp Image

Horiz. 35 	*Vert.* 35			
Distance: 20′	10′	7′	5′	3½′
Body Size: Group	full body	¾ body	½ body	H&S

Basic Outdoor Daylight Shot I

Shutter speed, 1/250

Film	*Brightness V 10*		*BV 9* 		*BV 8* 		*BV 7* 	
	f	*EV*	*f*	*EV*	*f*	*EV*	*f*	*EV*
B&W, ASA 160/5.5°	11	16	8	15	5.6	14	4	13
Color neg., Universal 32	11	14	8	13	5.6	12	4	11
Color trans., ASA 160	11	16	8	15	5.6	14	4	13

Basic Available-Light Shot II

Incident Light Foot Candles		*Normal E.I. 160*		*Kodak Royal-X or Agfa Isopan Record E.I. 1300*		*Pushed Royal-X or Isopan Record 2000*	
		EV		EV		EV	
	CLASS 3 Bonfire, Building, Flood Circus, Bright Moonlight, Full Neon Lights						
48	Night Club, Bright Sports, Bright Street, Bright Stage, Bright Supermarket Theatre Marque, Bright	8½	$^1/_{100}$, $f/2$	11½	$^1/_{200}$, $f/4$	12½	$^1/_{200}$, $f/5.6$
	CLASS 2 Office, Bright						
24	Theatre Marque, Average	7½	$^1/_{50}$, $f/2$	10½	$^1/_{100}$, $f/4$	11½	$^1/_{200}$, $f/5.6$
	CLASS 1 Kitchen, Bright Night Club, Dim						
12	Room, Bright Store, Very Bright Street, Bright	6½	$^1/_{25}$, $f/2$	9½	$^1/_{50}$, $f/4$	10½	$^1/_{50}$, $f/5.6$
	CLASS 0 3 Ft./100 Watt Lamp Amusement Park Candlelight Church, Interior Furniture, Home Gaslight						
6	Home, 300 Watt Kerosene Lamp Kitchen, Average Matchlight/1 Ft. Office, Average Room, Average Snowing, Night Store Window, Average	5½	$^1/_{10}$, $f/2$	8½	$^1/_{25}$, $f/4$	9½	$^1/_{25}$, $f/5.6$

Basic Available-Light Shot II—(Continued)

Incident Light Foot Candles		*Normal E.I. 160*		*Kodak Royal-X or Agfa Isopan Record E.I. 1300*		*Pushed Royal-X or Isopan Record 2000*	
		EV		EV		EV	
	CLASS —1						
	3 Ft./50 Watt Lamp						
3	Stage, Dim	4½	1/5, *f*/2	7½	1/25, *f*/2.8	8½	1/25, *f*/4
	Store, Dim						
	Street, Dim						
	Subway, Station						
	CLASS —2						
	3 Ft./25 Watt Lamp						
	Hallway,						
1½	Night, Average	3½	1/2, *f*/2	6½	1/15, *f*/2.8	7½	1/25, *f*/2.8
	Railway, Cars						
	Stage, Dim						
	Subway Cars						

Extra-Long Exposure Time—Reciprocity Failure

When extra-long exposure times are indicated because of the small amount of light available, the film does not respond in the same way as when sufficient light is available for exposures between 1/1,000 and 1 sec. Therefore, compensation must be made for the failure of the film to respond, by increasing the exposure time as follows:

1/1,000 to 1 second, exactly as read.
5 sec. × 1.5 = 7 sec. is used
15 sec. × 2 = 30 sec. indicated
45 sec. × 2.5 = 1 min., 15 sec.
2 min. × 3 = 6 min.
5 min. × 4 = 20 min.
10 min. × 5 = 50 min.
20 min. × 6 = 2 hrs.

Flash Synchronization Settings

Setting X (only setting available)

Lamp	*Shutter Speed*
Class M (M5)	B to 1/30
Class F (SM)	B to 1/60
Speedlight	All speeds

Between-the-Lens Shutters

Lamp	*Synchronization Setting*	*Shutter Speeds*
Class M (M5)	M	All speeds
Class F (SM)	X	1 to 1/60
Speedlight	X	All speeds

Focal Plane Shutter

Lamp	*Synchronization Setting*	*Shutter Speeds*
Class M (M5 or 6)	FP	All speeds
Class F (SM)	X	B to 1/30
Speedlight	X	X fast-speed dial setting only

Guide Numbers for the Popular Flash Lamps

AG-1—with 2" Polished Reflector*

Tungsten Film Exposure Index	12	16	20	25	32	40 50 64	80 100 125	160 200 250	400 500 640
F, X, or M 1/25 & 1/30	48	55	65	70	80	110	140	200	360
F, X, or M 1/50 & 1/60	40	44	50	55	65	90	110	160	280
M (only) 1/100 & 1/125	32	38	42	48	55	75	95	130	240
M (only) 1/200 & 1/250	24	28	32	36	40	55	70	100	180
M (only) 1/400 & 1/500	19	22	24	26	30	42	50	75	130

*For satin reflector open ½ f/stop or multiply guide number by .84.

G-E BLUE FLASHBULBS AG-1B—with 2" Polished Reflector*

Daylight Film Exposure Index	10	12	25	32	64	100	160	200
F, X, or M 1/25 & 1/30	32	36	50	60	80	100	130	140
F, X, or M 1/50 & 1/60	26	28	40	48	65	80	100	120
M (only) 1/100 & 1/125	22	24	36	40	55	70	90	90
M (only) 1/200 & 1/250	18	20	28	32	44	55	70	80
M (only) 1/400 & 1/500	12	13	19	22	30	38	48	55

*For satin reflector open ½ f/stop or multiply guide number by .84.

PowerMite M2

USE: "F" or "X" synchronization { **USE: 1/50th second or slower shutter speed. (1/30 second or slower with Focal Plane Camera.)**

Tungten Film Exposure Index	12	16	20	25	32	40 50 64	80 100 125	160 200 250	500 640 800
3 to 6 Inch Polished Reflector*	60	70	80	90	100	120	180	240	440

*For satin reflector open ½ f/stop or multiply guide number by .84.

PowerMite M2B

USE: "F" or "X" Synchronization { **USE: 1/50th second or slower shutter speed. (1/30th second or slower with Focal Plane Camera).**

Daylight Film Exposure Index	10	12	25	32	64	100	160	200
3 to 6 Inch Polished Reflector*	44	46	65	75	110	130	170	190

*For satin reflector open ½ f/stop or multiply guide number by .84.

GUIDE NUMBERS FOR G. E. #6 AND PowerMite M5
(Focal Plane Only)

Tungsten Film Exposure Index	12	16	20	25	32	40 50 64	80 100 125	160 200 250	500 640 800
Shutter Open	P-95 S-75	P-110 S-90	P-120 S-100	P-130 S-110	P-150 S-130	P-190 S-160	P-260 S-220	P-380 S-320	P-650 S-550
1/100 & 1/125	P-55 S-44	P-65 S-50	P-70 S-55	P-80 S-65	P-90 S-70	P-110 S-90	P-160 S-130	P-220 S-180	P-400 S-320
1/200 & 1/250	P-38 S-30	P-40 S-36	P-44 S-40	P-50 S-44	P-60 S-50	P-70 S-60	P-100 S-90	P-140 S-120	P-260 S-220
1/400 & 1/500	P-26 S-22	P-30 S-28	P-34 S-28	P-38 S-32	P-44 S-36	P-55 S-44	P-75 S-65	P-110 S-90	P-180 S-160
1/1000 & 1/1250	P-18 S-13	P-19 S-15	P-22 S-17	P-24 S-19	P-26 S-22	P-34 S-28	P-48 S-38	P-70 S-55	P-120 S-95

GUIDE NUMBERS FOR G. E. #6B AND PowerMite M5B
(Focal Plane Only)

Daylight Film Exposure Index	10	12	25	32	64	100	200
Shutter Open	P-60 S-50	P-65 S-55	P-95 S-80	P-110 S-90	P-150 S-130	P-190 S-160	P-260 S-220
1/100 & 1/125	P-36 S-26	P-40 S-28	P-55 S-40	P-65 S-48	P-90 S-65	P-110 S-80	P-160 S-120
1/200 & 1/250	P-24 S-19	P-26 S-20	P-38 S-30	P-44 S-34	P-60 S-48	P-75 S-60	P-110 S-85
1/400 & 1/500	P-17 S-13	P-19 S-14	P-26 S-20	P-30 S-24	P-42 S-32	P-50 S-40	P-75 S-60
1/1000 & 1/1250	P-11 S-8	P-12 S-9	P-18 S-13	P-20 S-14	P-28 S-20	P-36 S-26	P-50 S-36

Basic Direct-Flash Shot IIIb, Speedlight

50 Watt/sec. Speedlight at X	*Distance*	*Daylight Kodachrome GN 33-39*			*Kodacolor GN 52-59*			*Daylight Kodachrome II Ektachrome GN 43-49*			*B&W ASA 100 GN 150*			*Pola Pan GN 200*		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Group	14′	2.8	2	1.4	4	2.8	2	3.5	2.5	2	11	8	5.6	4 EV 13	—	—
Full body	10′	4	2.8	2	6	4	3	5	3.5	2.5	16	11	8	5 EV 14	4 EV 13	—
¾ body	7′	5.6	4	2.8	8	6	4	7	5	3.5	22	16	11	6 EV 15	5 EV 14	4 EV 13
½ body	5′	8	5.6	4	12	8	6	10	7	5	22 + TWH	22	22 + TWH	7 EV 16	6 EV 15	5 EV 14
H & S	3½′	11	8	5.6	16	12	8	14	10	7	22 +2 TWH	22 + TWH	22	8 EV 17	7 EV 16	6 EV 15

Column A applies to subjects within 1 to 2′ from a wall.

Column B applies to subjects within 3 to 6′ from a wall.

Column C applies to subjects more than 6′ from a wall or outdoors at night.

Basic Direct-Flash Shot IIIa, Flash Lamp

Flashlamp: M5 *Shutter Speed: 1/25 or 1/30* *Synchronization: M*		*Color or B&W, ASA 125*	*Kodacolor; Ektachrome Type F; Kodachrome II "A" and 81 "C"*
		G.N. 260	*G.N. 120*
Body Size:	Distance		
Group	20′	*f*/13	*f*/6.3
	14′	*f*/18	*f*/9
Full body	10′	*f*/22	*f*/13
¾ body	7′	*f*/22 + TWH	*f*/18
½ body	5′	*f*/22 + 2TWH	*f*/22
H&S	3½′	*f*/22 + 3TWH	*f*/22 + TWH

It is more correct to switch to a smaller flash lamp for near distances, but it is more practical to use one lamp and cut down the amount of light with a TWH (thin white handkerchief).

Basic Bounce-Flash Shot IVa, Flash Lamp

Flash Lamp: M5. Synchronization: M.

Shutter Speed: Most suitable (1/25 or 1/30 is safe).

Light: Lamp shining up to 8′ ceiling.

Ceiling Color: White.

Camera Distance	*3½′ to 9′*	*10′ to 14′*	*15′ to 20′*
B&W ASA 125 or High Speed Ektachrome, Tungsten	*f*/18	*f*/13	*f*/9
Kodak Kodacolor, Ektachrome "F"; Kodachrome II "A" and 81 "C"	*f*/8	*f*/5.6	*f*/4

Basic Bounce-Flash Shot IVb, Speedlight

Speedlight: 50 watt-sec. unit. Synchronization: X.

Shutter Speed: Most suitable.

Light: Speedlight shining up at an 8′ white ceiling.

Camera Distance	*3½′ to 9′*	*10′ to 14′*	*15′ to 20′*
B&W ASA 125 or High Speed Ektachrome	*f*/8	*f*/5.6	*f*/4
Kodak Kodacolor; Kodachrome II or Ektachrome, Daylight	*f*/3.5	*f*/2.5	*f*/1.9

Basic Direct-Floodlight Shot Va

Exposure Suggestion:

B&W ASA 125 or
High-Speed Ektachrome ..... 1/50 @ *f*/4.5, or EV 10½
Kodak Kodacolor ..... 1/50 @ *f*/2.8, or EV 8
Kodak Kodachrome, Type A ..... 1/25 @ *f*/2.8, or EV 7
Kodak Kodachrome II "A" ..... 1/50 @ *f*/3.5, or EV 8.5

Lamps: 3 BFA-375

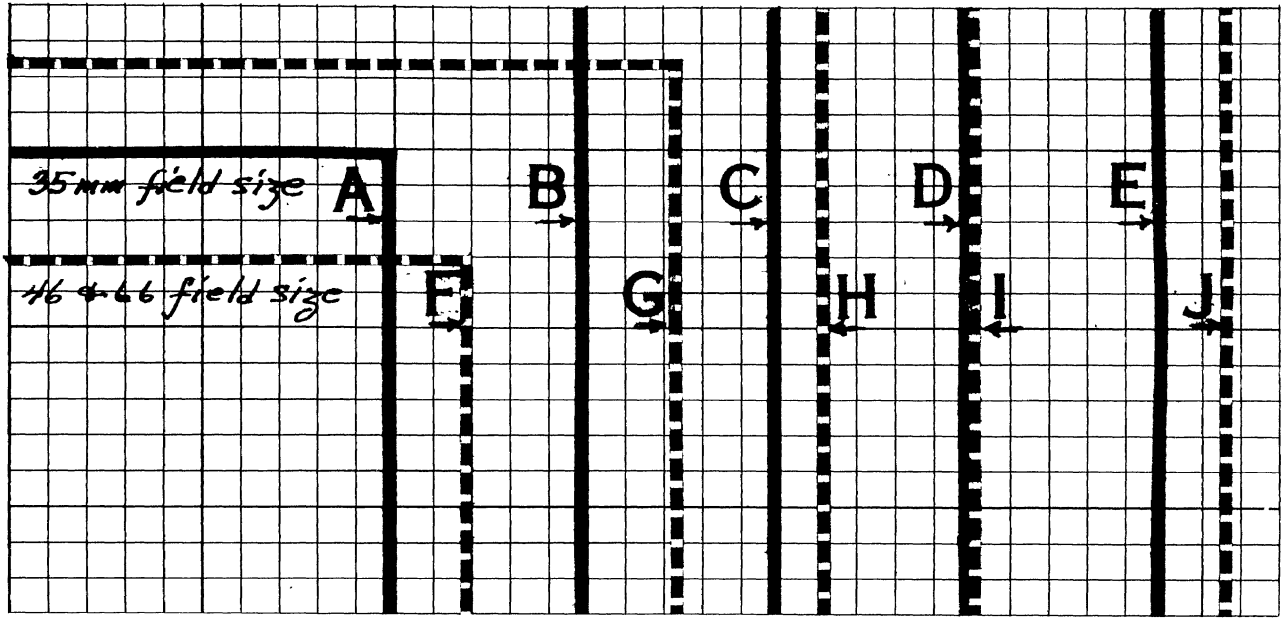
Lamps	*Distance*	*Camera Angle*	*Subject Elevation*
A	5′	5 to 10°	20°
B	5′	135° left	45°
C	5′	135° right	45°

1. Subject and camera are considered to be in a straight-line axis.
2. Lamp A is moved 5′ from subject at lens level.
3. It is moved 5 to 10 deg. to the side.
4. It is raised 20 deg. above head of, and pointed at, subject.
5. Lamps B and C must be behind subject as they are 135 deg. to subject-to-camera axis.

Basic Bounce-Floodlight Shot Vb

Lamp: 1 BFA-375; light shining at a 45° angle 2′ from ceiling. Ceiling height, 8′; ceiling, white.

Film	*Subject Distance*	
	3½′ to 9′	10′ to 14′
B&W ASA 125 or High-Speed Ektachrome T	1/30 @ *f*/3.5, EV 9½	1/30 @ *f*/2.5, EV 8½
Kodak Kodacolor	1/30 @ *f*/2, EV 7	— —
Kodak Kodachrome, Type A	1/15 @ *f*/2, EV 6	— —
Kodak Kodachrome, II "A"	1/30 @ *f*/2.5, EV 7½	1/15 @ *f*/2.5, EV 6½



THE TYDINGS PORTRAIT CLOSEUP LENS CHART

Solid lines for 45-58mm lens on 1x1½" frame; dotted lines for 60mm lens on 4x4 cm. frame or 75-80mm lens on 6x6 cm. frame

Closeup Portrait Lens Charts

1. 35mm lens, 1x1½" frame size

Box	*Field Size*	*Image Ratio*	*Portrait Lens*	*Lens Focus*	*Subject Distance*
	28½ x 19	20:1	+1	Inf. (∞)	39"
	21 x 14	15:1	+1	10'	29½"
	15 x 10	10:1	+1	4'	20"
	12 x 8	8:1	+2	8'	16½"
	10 x 6¾	7:1	+2	5'	14"
E	9 x 6	6:1	+3	∞	12"
D	7½ x 5	5:1	+3	4'	10"
C	6 x 4	4:1	+5	∞	8"
B	4½ x 3	3:1	+6	∞	6⅔"
A	3 x 2	2:1	+10	∞	4"

No exposure increase necessary.

2. 60mm lens, 1⅝" (4x4 cm.) frame size

Box	*Field Size*	*Image Ratio*	*Portrait Lens*	*Lens Focus*	*Subject Distance*
	21 x 21	13:1	+1	∞	31"
	15⅜ x 15⅜	9.5:1	+1	4'	23"
	13 x 13	8:1	+2	∞	19"
	10½ x 10½	6.5:1	+2	4'	15"
	8 x 8	5:1	+3	∞	13"
J	6¼ x 6¼	3.7:1	+3	4'	10½"
I	5 x 5	3.1:1	+4	4'	8¼"
H	4¼ x 4¼	2.7:1	+5	4'	6¾"
G	3½ x 3½	2.2:1	+6	4'	6"
F	2⅜ x 2⅜	1.4:1	+10	4'	4"

No exposure increase necessary.

3. 75-80mm lens, 2¼" (6x6 cm.) frame size

Box	*Field Size*	*Image Ratio*	*Portrait Lens*	*Lens Focus*	*Subject Distance*
	22 x 22	10:1	+1	∞	31"
	16 x 16	7.5:1	+1	4'	23"
	13 x 13	6:1	+2	∞	19"
	11 x 11	5:1	+2	4'	15"
	7 x 7	3.5:1	+3	4'	10½"
J	5⅜ x 5⅜	2.7:1	+4	4'	8⅜"
I	4⅝ x 4⅝	2.2:1	+5	4'	7"
H	4 x 4	2:1	+6	4'	6"
G	3¼ x 3¼	1.5:1	+8	∞	5"
F	2¼ x 2¼	1:1	+10	4'	4"

No exposure increase necessary.

Closeup Shooting Routine

1. Place object on graph; read box.
2. Attach correct closeup lens.
3. Focus and set distance.
4. Light.
5. Read light.
6. Set exposure.
7. **SNAP.**

Extension Tube Close-up Data

50mm Field Size Variable	Image Ratio	Lens Plus	Lens to Object	Exposure Increase
		0		1,0
240 x 360	10:1	5	550	1,2
120 x 180	5:1	10	300	1,4
90 x 120	3.3:1	15	217	1,7
60 x 90	2.5:1	20	175	2,0
48 x 72	2:1	30	133	2,6
34 x 51	1.5:1	35	121	2,9
30 x 45	1.3:1	40	113	3,2
27 x 40	1.1:1	45	106	3,6
24 x 36	1:1	50	100	4,0
20 x 30	5/6:1	60	92	4,8
17 x 26	2/3:1	70	86	5,8
15 x 23	2/3:1	80	81	6,8
13 x 20	1/2:1	90	78	7,8
12 x 18	1/2:1	100	75	9,0
10 x 15	1/2.4:1	120	71	11,6
9 x 13	1/2.5:1	140	68	14,4
8 x 11	1/3:1	160	66	17,6
7 x 10	1/3.4:1	180	64	21,2
6 x 9	1/4:1	200	63	25,0

58mm Field Size Variable	Image Ratio	Lens Plus	Lens to Object	Exposure Increase
		0		1,0
267 x 400	11:1	5	731	1,2
141 x 212	6:1	10	394	1,4
92 x 138	3.7:1	15	282	1,6
69 x 103	2.9:1	20	226	1,8
56 x 84	2.3:1	25	192	2,1
46 x 69	2:1	30	170	2,3
40 x 60	1.7:1	35	154	2,6
35 x 52	1.5:1	40	142	2,9
31 x 46	1.3:1	45	133	3,2
28 x 42	1.1:1	50	125	3,5
23 x 35	1:1	60	114	4,1
20 x 30	5/6:1	70	106	4,9
17 x 26	2/3:1	80	100	5,7
15 x 23	2/3:1	90	95	6,5
14 x 21	1/2:1	100	92	7,4
12 x 17	1/2:1	120	86	9,4
10 x 15	1/2.4:1	140	82	11,7
9 x 13	1/2.5:1	160	79	13,8
8 x 12	1/3:1	180	77	16,8
7 x 10	1/3.4:1	200	75	19,8

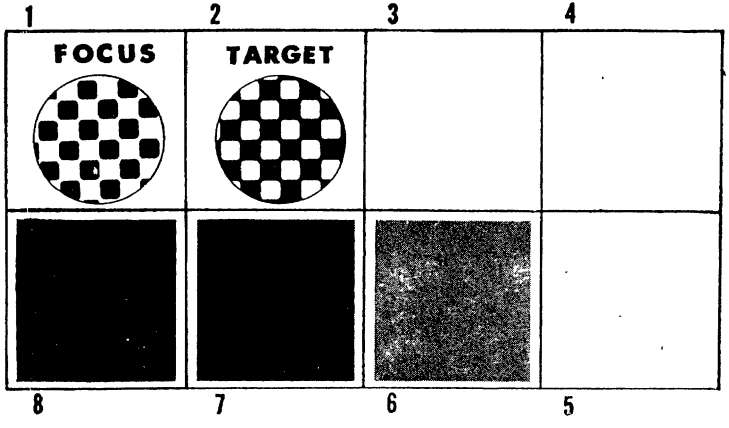
Extension Tube Close-up Data —(Continued)

90mm Field Size	Image Ratio	Lens Plus	Lens to Object	Exposure Increase
543 x 648	18:1	5	1710	1.1
144 x 216	6:1	15	630	1.4
108 x 162	4.5:1	20	495	1.5
72 x 108	3:1	30	360	1.8
62 x 93	2.6:1	35	321	2.0
48 x 72	2:1	45	270	2.3
36 x 54	1.5:1	60	225	2.8
24 x 36	1:1	90	180	4

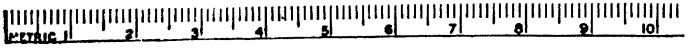
135mm Field Size	Image Ratio	Lens Plus	Lens to Object	Exposure Increase
600 x 900	25:1	5	3780	1.1
218 x 327	9:1	15	1350	1.2
160 x 240	7:1	20	1046	1.3
109 x 164	4.5:1	30	742	1.5
92 x 138	4:1	35	656	1.6
73 x 109	3:1	45	540	1.8
55 x 82	2.3:1	60	439	2.1
36 x 54	1.5:1	90	338	2.8
24 x 36	1:1	135	270	4.0
18 x 27	2/3:1	180	236	5.4

180mm Field Size	Image Ratio	Lens Plus	Lens to Object	Exposure Increase
432 x 648	18:1	10	3420	1.1
144 x 216	6:1	30	1260	1.4
108 x 162	4.5:1	40	990	1.4
72 x 108	3:1	60	720	1.8
62 x 93	2.6:1	70	642	2.0
48 x 72	2:1	90	540	2.3
24 x 36	1:1	180	360	4.0

Gray Scale and Closeup Ruler Table



Place millimeter rule in plane of image; vertically to the 24mm dimension. Read number of millimeters on ground glass. Check (with chart) exposure time or *f*/opening increase that must be given. 88× or 196× may seem to be considerable exposure increases, but for well-exposed pictures follow the chart.



Millimeter Ruler Factors

If at entire 4" dimension	*or if at entire 2¼" dimension*	*or if at entire 1" dimension*	*Magnification*	*Exposure Factor*	*f/Stop Increase*
4mm	2mm	1mm	25X	676X	9¼
8mm	4mm	2mm	14X	225X	7½
12mm	6mm	3mm	8⅓X	88X	6½
16mm	8mm	4mm	6¼X	53X	5½
20mm	10mm	5mm	5X	36X	5
24mm	12mm	6mm	4¼X	30X	5
28mm	14mm	7mm	3⅓X	16X	4
32mm	16mm	8mm	3X	14X	3⅔
36mm	18mm	9mm	2⅔X	12X	3½
40mm	20mm	10mm	2½X	11X	3⅓
44mm	22mm	11mm	2⅓X	9X	3⅓
48mm	24mm	12mm	2X	9X	3⅓
52mm	26mm	13mm	2X	8X	3
56mm	28mm	14mm	1⅔X	7X	2⅔
60mm	30mm	15mm	1⅗X	6X	2½
64mm	32mm	16mm	1⅓X	6X	2½
68mm	34mm	17mm	1⅓X	5X	2⅓
72mm	36mm	18mm	1¼X	5X	2⅓
76mm	38mm	19mm	1¼X	5X	2⅓
80mm	40mm	20mm	1⅕X	4X	2
84mm	42mm	21mm	1⅕X	4X	2
88mm	44mm	22mm	1 1/10X	4X	2
92mm	46mm	23mm	1X	4X	2
96mm	48mm	24mm	1X	4X	2

Close-up Lens Extension Compensation Chart

Field seen at 1" dimension	160 mm	70 mm	48 mm	30 mm	25 mm	24 mm	18 mm	14 mm	13 mm	9 mm	8 mm	7 mm	6 mm	4 mm	3 mm	2 mm	1 mm
Exposure Ext. or Filter Factor	1.3×	1.7×	2×	2.7×	3.4×	4×	5.2×	6.8×	8×	12×	14×	16×	32×	53×	84×	196×	676×
Stops to open	⅓	⅔	1	1⅓	1⅔	2	2⅓	2⅔	3	3⅓	3⅔	4	5	5⅔	6⅓	7⅔	10
f/32	*f*/28	*f*/26	*f*/22	*f*/20	*f*/18	*f*/16	*f*/14	*f*/13	*f*/11	*f*/10	*f*/9	*f*/8	*f*/5.6	*f*/4.5	*f*/3.5	—	—
f/22	*f*/20	*f*/18	*f*/16	*f*/14	*f*/13	*f*/11	*f*/10	*f*/9	*f*/8	*f*/7	*f*/6.3	*f*/5.6	*f*/4	*f*/3.2	—	—	—
f/16	*f*/14	*f*/13	*f*/11	*f*/10	*f*/9	*f*/8	*f*/7	*f*/6.3	*f*/5.6	*f*/5	*f*/4.5	*f*/4	—	—	—	—	—
f/11	*f*/10	*f*/9	*f*/8	*f*/7	*f*/6.3	*f*/5.6	*f*/5	*f*/4.5	*f*/4	*f*/3.5	*f*/3.2	—	—	—	—	—	—
f/8	*f*/7	*f*/6.3	*f*/5.6	*f*/5	*f*/4.5	*f*/4	*f*/3.5	*f*/3.2	—	—	—	—	—	—	—	—	—
f/5.6	*f*/5	*f*/4.5	*f*/4	*f*/3.5	—	—	—	—	—	—	—	—	—	—	—	—	—
f/4	*f*/3.5	*f*/3.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

A Sharp Image: Check focus and/or read the number of millimeters of the ruler which is temporarily placed in the field. Read the 1" dimension of the ground glass.

A Well-Exposed Image (we will do this in the form of an actual calculation): Take a basic exposure meter reading. Let us say that the amount of light for the film in the camera calls for an exposure of *f*/8 @ 1/50. The Close-up Lens Extension Compensation is made in this way by reading:

Line 1 until we come to the number of lines seen on the ground glass, e.g., 14 lines are seen in our example.

Line 2 is scanned for the exposure extension factor that applies to 14 lines—6.8X in this case.

Line 3 tells us that a 2⅔ stop increase is needed. So, instead of *f*/8, the lens is opened to *f*/3.2, and the exposure is made.

Special Situations: If the lens does not have an *f*/3.2 opening, then open the lens 1⅔ stops from *f*/8 to *f*/4.5 to take care of 1⅔ stops of the 2⅔ stops needed and give twice long the exposure from 1/50 to 1/25 sec. to account for the other stop increase that would be necessary. If the lens is already at its widest due to the small amount of light which may exist, then the shutter speed may be made longer. In our example, should *f*/8 be needed, then the 1/50 is divided by 6.8X, and an exposure of 1/7 sec. would be required. 1/8 sec. may be used if available on the camera or 1/10 and the lens opened 1/3 stop.

Shutter Time Lens Extension Compensation, Including Reciprocity Failure Adjustment

mm seen on ground-glass															
160	70	48	30	25	24	18	14	13	9	8	7	6	4	3	2	1
Exposure Factor																
1.3	1.8	2	2.8	3.5	4	5X	7X	8X	12X	14X	16X	30X	53X	88X	196X	
1 second becomes																
1⅓	1⅘	2	2⅘	3½	6	7½	10	13	20	28″	32″	75″	2½′	5′	8′	

Color Correction with Addacolor

Addacolor is a method for binding sheets of color gelatin directly to your transparency. The choice of an Addacolor gelatin helps correct and control your final transparency color to overcome minor deficiency of exposure or mismatching light sources.

Transparency	*Addacolor**
Too blue	Yellow
Too green	Red
Too yellow	Blue
Too red	Green

*A product of Lou Bertz Specialties, 6268 Romaine St., Hollywood 38, Calif. It is available from your camera dealer.

As another advantage, Addacolor permits over-correction toward a warmer or fuller color for individual creative interpretation. The simplicity of the process is ideal. It will save many priceless transparencies that otherwise would be discarded because of color-balancing deficiencies.

Black-and-White Filters for Better Picture Tones

COLOR OF SUBJECT	TO LIGHTEN	TO DARKEN
Blue	Blue	Red-orange
Blue-green	Blue-green	Red-orange
Brown	Orange-red	Blue
Green	Green-orange	Red-blue
Magenta	Red	Green
Orange	Yellow-orange-red	Green-blue
Pink	Red	Green
Purple	Blue	Green
Red	Red	Blue-green
Violet	Blue	Red-green-yellow
Yellow	Yellow-orange Green-red	Blue

Black-and-White Filter Exposure Factors

B&W Filter	*Exposure Increase*		*EV Adjustment*		*Photographic Purpose*
	Day	Tung.	Day	Tung.	
Medium Yellow	2X	3X	1	1½	Produces normal skin tones, clouds (panchromatic film only).
Green	3X	4X	1½	2	Lightens foliage, separates different greens.
Orange	4X	5X	2	2⅓	Darkens blues (sky tones, etc.), dramatizes outdoors.
Red	8X	8X	3	3	(Panchromatic and Infra Red only). Blackens skies, night effects in daylight.
Blue	1.5	1.5	½	½	Darkens lips with portraits, copying stamps.
UV	1.5	1.5	½	½	Reduces ultra-violet light which would produce an over-exposed sky.
Polarizing	2.5	2.5	1¼	1¼	Reduces glare, increases contrast, darkens skies.

Black-and-white filters recommended for photography *cannot* be used with color film. Only the U.V. and the polarizing filter can be used with color film.

Black-and-White Developers for Every Purpose

Developer Effect	*Developer Time 68° F. (min.)*	*Developer*
Soft, compensating (expose twice normal)	13-18	Metol 2.5, sodium sulfite dess. 25, water to 1000cc
New normal speed exposure index	8-10	Kodak Microdol. Replenish with Microdol Replenisher
	7-10	Kodak D-76 or D-23
½X speed	4-5	Ethol UFG
2X speed	12-20	Ilford Microphen, FRX-500 (1:10)
3X speed	6-8	Ethol UFG
5X speed	12 (full strength)	Kodal Microdol Replenisher
High definition	10-12	*Solution A:* Metol 10, sodium sulfite dess. 50, water to 1000. *Solution B:* Sodium carbonate monohydrate 53.5 gm., water to 1000. *To use:* Add 50cc Solution A to 500cc water; then add 50cc Solution B. Use only once.
High-contrast compensating	7-10	*Solution A:* Pyrocatechol 8, sodium sulfite dess. 1.25, water to 1000. *Solution B:* Sodium hydroxide 10%. *To use:* Add 12cc Solution A to 500cc water; then add 7cc Solution B. Use only once.

Formula D-23

Metol	7.5
Sod. sulf. dess.	100.0
Water q.s. ad	1,000.0

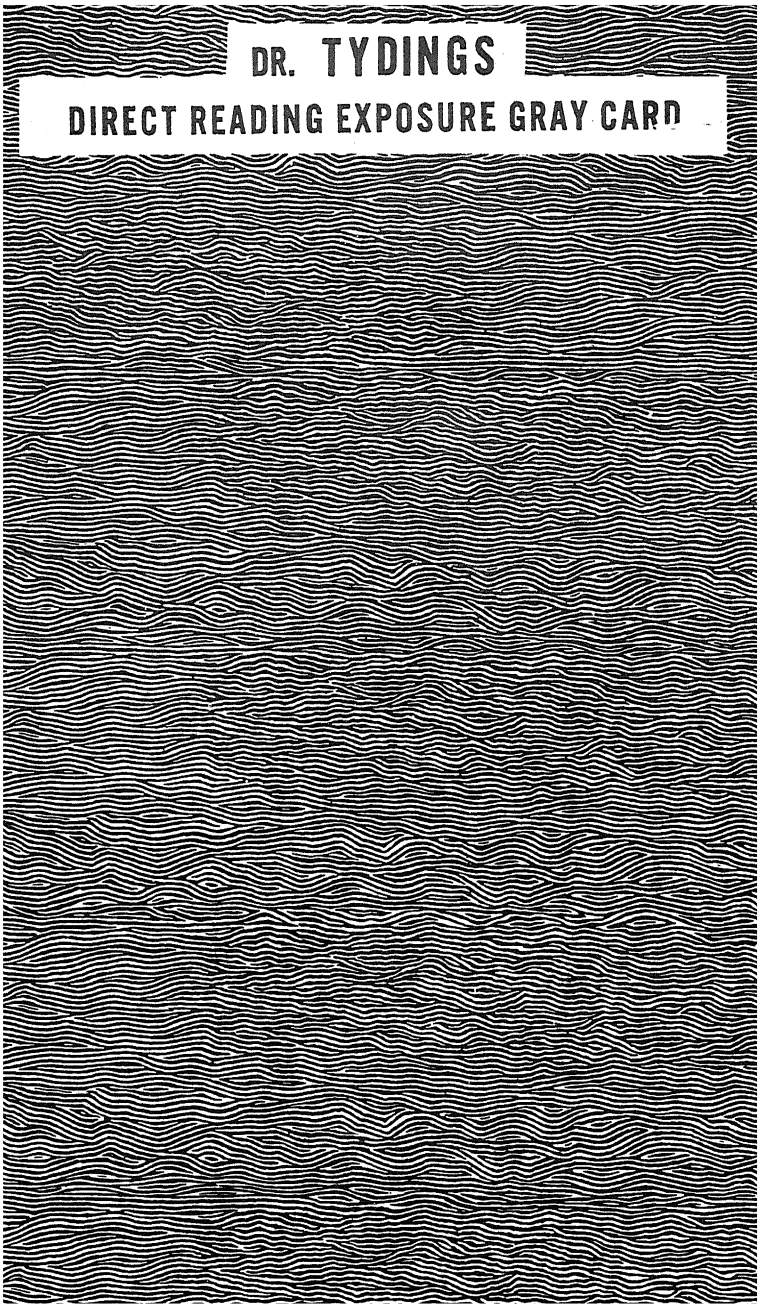
Tydings' D-23 Compensating Method

Solution A:		*Solution B:*	
D-23	200.0	Kodalk	5.0
Water	300.0	Water ad	500.0

Film: ASA 125:
Develop with Solution A for 12 min. at 68° F; pour out and, without rinsing, add Solution B for 3 min.; *do not* agitate Solution B for the first 1 min. Rinse; fix.

Film: ASA 320:
Develop 15 min. in Solution A.

Film: ASA 40:
Develop 10 min. in Solution A.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